

M. Prevost

9244330

Winter Dinner

by

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DESCRIPTION OF PROJECT

The Santee-Cooper Project, located in the Santee and Cooper Rivers in South Carolina, comprises the following principal features:

- a. An earthern diversion dam about 8 miles long across the Santee River at Wilson Landing, Mile 87, with a concrete spillway of 800,000 cubic feet per second capacity.
- b. The Santee reservoir covering an area of about 155 square miles having a maximum depth of 35 feet with water levels ranging from 64 to 75 feet above mean sea level.
- c. An earthern dam about 2 miles long across the drainage basin of Cooper River near Pinopolis, S.C., flanked by about 26 miles of earthern dikes
- d. The Pinopolis reservoir on the headwaters of the Cooper River coverin an area of 95 square miles having a maximum depth of 65 feet with water levels ranging from 60 to 75 feet above mean sea level.
- e. A diversion canal about 8 miles long, 10 feet deep at maximum water level, and 200 feet wide, connecting the two reservoirs.
- f. A power house and appurtenances at the Pinopolis dam.
- g. A single-lift lock in the Pinopolis dam near the power house, 60 feet wide and 180 feet long, with a depth of 12 feet over the sills. The lock has a lift of 75 feet, one of the highest in the United States.
- h. A channel 14 feet deep at normal tail water level, at least 300 feet wide and 4-1/2 miles long from the power house to Coopner River for tail water navigation.

The project is now practically completed; operation of the project began with the diversion of the Santee River in April 1942.

The watershed of the entire river system comprises 15,700 square miles;

the area above the Santee Dam comprises 14,910 square miles. The average discharge at Ferguson guage above Santee dam the wettest year of record was 30,500 second-feet in 1929; the average the driest year of record was 11,300 second-feet in 1927. The Federal Power Commission license permits the diversion of all waters down to a minimum of 500 second-feet. The planned operating discharge of the power plant will require diversion down to this minimum a long portion of the time during years of normal rainfall; and practically all of the time during years of low rainfall.

THE LOWER SANTEE RIVER BASIN

The area to be considered in this report will be limited to the Santee River Basin below the Santee dam. In this reach the river flows through a low flat flood plain bordered by rolling sand hills. In its lower 18 miles, Santee River is divided into two channels known as "North Santee" and "South Santee". The mean tidal range at the mouth of the Santee River is 5.2 feet and at Wambaw Creek, mile 15, it is 4 feet. Before diversion tidal fluctuation extended upstream to Luends Ferry, mile 38. Since diversion the point of perceptible fluctuation has moved 10 miles farther upstream, or to mile 48. High and low stage elevations, however, are 0.5 feet lower since diversion than before.

From the crossing of the Intracoastal Waterway to the head of the tidal reach, the width ranges from 800 feet to 500 feet, with ordinary low water depths ranging from 20 to 4 feet. The stream has an easy winding course. The stream bottoms and banks of this section are composed of mud, sand, and clay - and the bank elevations through marsh and woodland range from 4 to 14 feet above mean low water.

From Luends Ferry to the Santee dam at mile 87, the average width is 400 feet. Prior to the construction of the dam, depths at ordinary water ranged from 4 to 20 feet with a controlling navigable low water of depth of 4.0 feet. Since the completion of the dam and the diversion of the stream,

the controlling navigable depth is less than 2.0 feet.

River discharge has been greatly reduced since the diversion of the stream flow. The mean monthly flow has been reduced from 16,980 second-feet to 3,420 second-feet. A minimum flow 91 second-feet has been recorded. Maximum, minimum, and mean monthly discharges at the approximate Santee damsite for relative control periods are shown in Table ____

The reduction in stream discharge has been accompanied by a corresponding decrease in river stages. Record before diversion indicate that during a 33-year period of record the Santee River reached overbank stage 223 times. The duration of the overbank stage during the period was 3,808 days.

Under modified conditions it is estimated that the river would have reached overbank stage 41 times during the 33-year period of record and that the duration of the overbank stage would have been 218 days. Table ____ shows the estimated probable reduction that diversion would have effected in the frequency and duration of overbank stages at the Ferguson gauge. Only the larger of these floods overtop the dikes protecting the old rice fields in the delta region. These would be reduced but little by diversion.

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growth, from the Santee dam to the marshes of the lower tidal reach. Out of a total of 312 square miles in the flood plain below the dam, 264 square miles are in forest, including only a small amount of open land. Forest growth consists principally of red gum, black gum, loblolly pine, green ash, cottonwood popular, overcup oak, hackberry, cypress. Lumbering operations have been difficult due to the frequent overflow from the river, and only the more valuable timber has been cut.

On the uplands adjacent to the bottom lands are extensive forests composed of loblolly and long-leaf pine with a mixture of hardwoods.

There is very little agriculture. Farming is limited for the most part to the outer edges of the river bottoms where lands are slightly higher, and to scattered clearings in the uplands.

The river bottoms and adjacent uplands comprise excellent habitat for whitetail deer, wild turkey, black bear, raccoon, mink, opossum, and waterfowl. Wild ducks use the river bottoms during the period of overflow, feeding on acorns and resting in the swamp lands.

This area has been adversely affected as a waterfowl habitat by the reduction in the frequency and duration of flooding, due to the operation of Santee Dam.

Drainage has been improved and portions are suitable for agriculture, but the constant threat of flood waters suddenly released from the Santee reservoir has discouraged clearing of lands or grazing of livestock. Lumbering operations, however, have become more intensive to the detriment of wildlife habitat.

ECOLOGY OF THE LOWER SANTEE DELTA (Before and after Diversions)

Area	Total	Pre-project Forest	Marsh	water	Total	Post-project Forest	Marsh	water
<u>Marsh:</u>								
Salt marsh	100	0	100	c	44,500	5,330	36,470	1,020
Brackish marsh	17,600	6,550	10,000	1,050	28,900	730	37,150	600
Fresh marsh	71,700	6,100	64,050	1,550	16,000	5,390	27,520	980
TOTAL	89,400	12,650	74,150	2,600	89,400	12,650	74,150	2,600
Tension Zone; 1/4 mile wide between salt and brackish								
Brackish and fresh	—	—	—	—	3,750	—	—	1,050

Tension Zone; 1/4 mile wide between salt and brackish

Brackish and fresh 2,100

$$\frac{1}{C_0}$$

6-E Locks:

(a) Description (If locks through dams form part of project describe location, purpose and proposed operation):

(b) Details:

Lift _____ Feet, Length _____ Feet, Width _____ Feet, Capacity of
Lock Chambers _____ Cubic Feet, Length of Time Required
To Empty Chamber _____ Minutes, Probable Frequency
Of Operation _____ Per Day _____

(c) Describe Possible Effect of Emptying Lock Chambers on River Stages Below
Dam: _____

6-F Levees:

(a) Describe (Location, Purpose, Future Vegetative Cover): _____

(b) Details:

Height Above River _____ Feet, Top Width _____ Feet, Inner
Side Slope _____ To One, Outer Side Slope _____ To One,
Distance Set Back From River Bank _____ Feet.

(c) Effect on River Stages: _____

b. Commercial fishing was never of major importance in any of the affected waters ^{in South Carolina} as regulations restrict the use of all commercial tackle except wire baskets. Catfish, carp and bullheads were taken for market, and fair catches of shad were reported during the spawning runs of these fish in the spring.

The total annual pre-project value of fishery resources for the affected area was approximately \$35,530. A breakdown of this value is shown in Table 1.

B. Effects of the project on fish

Severe losses to fishery in the Santee River Basin have resulted from diversion of waters from the Santee River through the Santee Diversion Canal to Cooper River. Reduced mean flows in that stretch of river below Santee-Cooper Dam has tended to maintain water levels in the river at a much lower level than prior to diversion. Streams, lakes and bayous in the flood plain that were previously subject to periodic flooding for periods from several weeks to months duration have been reduced approximately fifty percent and are inundated for much shorter periods under present dam operation. For the period from 1908 to 1940, both dates inclusive, the Santee River reached over-bank stage 223 times ~~xxxxxxxxxxxxxx~~ and remained in flooded condition for a total of 3,808 days. During these flooded conditions, fish utilized the overflow areas as feeding and spawning grounds, and the freshening and fertilizing effects of the overflow on permanent waters add to the fishery productivity of these areas. Supplemental stocking and stabilizing of fish populations in permanent waters is an added benefit of overflow.

Under the plan of operation of the Santee-Cooper project, the overflows would be virtually eliminated. During the period of 1908 to 1940, both dates inclusive, the U. S. Engineers estimated that the Santee River would have reached over-bank stage 41 times and remained in flooded condition for a total of 218 days under ~~proposed plan of dam operation~~. Floods of short duration are of little or no value to fishery. When the water does not stay over the vegetated areas long enough for decomposition to occur, no appreciable amount of fertility is afforded the waters. Feeding and spawning areas ~~are~~ not afforded by short floods as waters are not stable for periods long enough for reproductive cycles to be completed, nor are foods of the overflowed areas available for periods long enough to be of appreciable benefit. In addition to a reduction in quality of habitat, the quantity ~~is~~ also reduced. By reducing the mean flows of the Santee River, the backwater effects in tributary streams have been correspondingly reduced. Previously, water backed into the streams and fishing was afforded by these tributaries during periods of high water. Under present conditions, the backwater areas effects of the tributaries are reduced in acreage and period of inundation. Natural drainage of these streams never afforded enough water to create fishable habitat; therefore, with virtual elimination of backwater effects on the tributaries the fishery of these streams have been practically lost. Lakes in the backwater area that have been removed from the major effects of overflow have shown a decided reduction in fishery value. The large-mouth bass and crappies can no longer be considered important species in these waters as they

have been replaced by high populations of bream. The taking of large-mouth bass or crappies is a rarity now rather than the rule as was the condition prior to diversion. The main stem of the Santee River was never a popular fishing stream, but some sport fishing for catfish and striped bass was afforded and market fishermen took catfish, carp, bullheads and shad. The shad and striped bass were taken only during the spawning runs of these species in the spring. The reduction in flows has reduced the quality of the habitat afforded to fishes until only small catches of carp, small bullheads and catfish area taken. The shad and striped bass runs have been so greatly reduced that little value can be assigned to these species.

The annual estimated postproject fishery value is \$10.025, a breakdown of which is shown in Table 2.

6-G Irrigation;

(a) Description of Area to be Irrigated (Location, Topography, Operation);

(b) Land to be Irrigated Directly From Reservoir

(c) Land to be Irrigated by Separate Diversions _____ Acres.

(d) Land to be Irrigated Indirectly by Separate Diversion Dams _____ Acres.

(e) Storage Capacity Allocated _____ Acres.

(f) Diversion Rate _____ Acre-Foot

(f) Diversion Dams: Number _____, Type _____ Acre-Feet.

Height _____, type _____
Feet, Length _____ Feet, Location _____

Total Length of Main or High Line Canal

(h) Total Length of Secondary Canal _____ Miles,

(i) Drainage (Will irrigate) Miles

(1) Drainage Will irrigation result in saturation, requiring drainage?

any areas? If so, give available details):

7. Physical Condition of Project Area Before Development:

A. Table of Minimum, Maximum and Average Monthly Rate of Flow

on _____ River or Creek
 at _____ State of _____
 Period of Record 19 _____ to 19 _____ Total _____ Years _____

Month	Minimum Mean Monthly Rate of Flow in Second-Feet	Maximum Mean Monthly Rate of Flow in Second-Feet	Average Mean Monthly Rate of Flow in Second-Feet	Remarks
October				
November				
December				
January				
February				
March				
April				
May				
June				
July				
August				
September				
Average for Period				

Note: The "Water Year" has been used instead of Calendar Year in order that a true water "Cycle" may be shown.

(a) Minimum Day _____ Second-Feet, Date _____

(b) Maximum Day _____ Second-Feet, Date _____

(c) Total Volume of Flow for Average Year _____ Acre-Feet

7-B Natural Barriers To Migration of Fish (Above or Below Dam):

7-C Existing Dams (Below or Above Reservoir):

No.	Location	Purpose	Height	Pool Area Acres	Pool Capacity Acre-Feet
(a)					
(b)					
(c)					
(d)					
(e)					

(f) Notes on Existing Dams:

7-D Existing Diversions (Below or Above Reservoir):

No.	Location	Purpose	Amount Diverted Acre-Feet
(a)			
(b)			
(c)			
(d)			
(e)			
(f)			
(g)			

(h) Notes on Diversions:

LOWER SANTEE RIVER

A. Pre-project fish resources

1. List of species in order of relative abundance

Carp	<u>Cyprinus carpio</u>
Channel catfish	<u>Ictalurus punctatus</u>
Blue catfish	<u>I. furcatus</u>
Willow catfish	<u>Villarius catus</u>
Bullheads	<u>Ameiurus spp.</u>
Large-mouth bass	<u>Huro salmoides</u>
White crappie	<u>Pomoxis annularis</u>
Black crappie	<u>Pomoxis nigromaculatus</u>
Bluegill	<u>Lepomis macrochirus</u>
Yellowbreasted sunfish	<u>L. auritus</u>
Warmouth	<u>Chaenobryttus gulosus</u>
Pickerel	<u>Esox niger</u>
Barred pickerel	<u>E. americanus</u>
Gars	<u>Lepisosteus spp.</u>
Gizzard shad	<u>Dorosoma cepedianum</u>
Hickory shad	<u>Pomolobus mediocris</u>
Common shad	<u>Alcsa sapidissima</u>
Alewife	<u>Pomolobus pseudoharengus</u>
Striped bass	<u>Roccus saxatilis</u>

2. Yield

a. Sport fishing in the Santee Basin including the main river, overflow lakes, streams and backwater areas varied from poor to good prior to construction of Santee-Cooper project on the main stem of the Santee River. The small lakes in the backwater area that were subject to periodic overflow afforded the best sport fishing for large-mouth bass, crappies and bream of any of the affected areas. Fair success was reported for these species from the backwater areas of tributary streams, but little or no fishing was afforded for the portions of these streams not affected by backwater from the Santee River. The main river afforded some sport fishing for striped bass and catfish, but angling for striped bass was restricted to the period of upstream movement of this species during spawning runs ~~of~~ the spring.

TABLE I

Estimated Annual Project Fishing Values

Water Area Affected	Mileage or Affected Miles	Acreage Acres	Value Per Unit Mile	Total Value
Santee River	49		\$300	\$14,700
Wando Creek	8		150	1,200
Wadkin River	14		120	1,680
Creek Creek	16		100	1,600
Chicken Creek	4		75	300
Gull Branch	5		150	750
Weatree Branch	8		75	600
Miscellaneous Streams	16		100	1,600
Pandos Lake		40	\$30	1,200
Claire Lake		35	30	1,050
Westee Lake		240	15	3,600
Dawino Lake		90	25	2,250
Miscellaneous Lakes		272	25	6,800
Totals	170	605	\$35.530	

TABLE 2

Estimated Annual Post-project Fishing Values

Water Area Affected	Milage or Affected Miles	Acreage Affected Acres	Value Per Unit Mil.	Total Value
Santee River	39		\$ 100	\$ 3,900
Waribau Creek	3		50	150
Wadmalaw River	11		40	440
Cedar Creek	11		30	330
Chicken Creek	4		25	100
Owl Branch	3		50	150
Wee Tee Branch	3		25	75
Miscellaneous	10		30	300
Parker Lake		30	\$ 10.	300
Cedar Lake		30	10.	300
Wee Tee Lake		610	5.	1,050
Dewhoo Lake		70	7.	490
Barrow Pt (Lindam)		160	9.	1,440
Miscellaneous Lakes		300	5	1500
TOTAL	84	700		\$ 10,025

HISTORY OF DUCKS IN SOUTH CAROLINA

The history of the waterfowl population and duck shooting in South Carolina may be told in the story of the rise, decline and disappearance of the rice industry in South Carolina and its neighboring states: North Carolina and the construction of the Santee-Cooper Hydroelectric Navigation Project. Georgia, and Florida. Rice culture in these states is now virtually extinct, as much so as the Aztec Indian civilization of Mexico, or the Roman Empire of the western hemisphere. The waterfowl population has been declining for the past 20 years, and although this decline has not coincided exactly with the cessation of rice production, the two are closely related. That there should have been and was a lag in the dwindling of the duck population will be obvious after a review of the facts presented herein.

Since 1942 the duck population has been severely affected by the diversion of the Santee River into the Cooper River, following the construction of the Santee-Cooper Hydroelectric-navigation project. The duck will not become extinct in South Carolina, but the wintering population will be reduced to the carrying capacity of the feeding grounds, which under existing conditions is extremely low. Further decline in the duck population may be expected unless the fresh and brackish marshes are rehabilitated and additional fresh-brackish marshes created.

How many ducks wintered on the coast of South Carolina when the first settlers arrived at the present site of Charleston in 1669 I cannot say, but if the truth were known, the numbers were far less than in more recent years? For food the ducks depended primarily upon the natural marshes in and near the mouths of the fresh water streams. The amount of natural

food available in these rivers was the primary factor limiting the number of ducks wintering in this area. A few were trapped and killed by the Indians and there was loss through predation, but these losses were negligible.

Rice was first introduced in 1686, presumably by a ship captain from Madagascar. The successful growing of rice in the coastal region had a paramount effect on the economic, social and cultural development of the low country. The first low country rice fields were made in the savannahs that had been marked down by the early explorers. Planting of rice then moved to the inland swamps where they were flooded from a reservoir or "reserve." Washo reserve on Blake Plantation, now a part of the Santee Gun Club, was used for the irrigation of rice. It now serves as a nesting area for great numbers of herons, egrets, anhingas and other wading birds. Audubon visited the rookery as early as _____

The tidal culture of rice was first developed near Georgetown in 1750 and later spread to all the fresh water streams. The rice plantations consisted of a system of fields in the river flood plain, surrounded by dikes equipped with trunks or floodgates to permit the control of water levels. Main canals and quarter ditches through the fields provided means of drainage and irrigation. For irrigation purposes fresh water could be taken from the rivers on flood tides, or released from the fields during ebb tides. Thus the location of the rice plantation was limited to the tidal reach of the rivers emptying into the ocean. The first plantations were developed in the natural freshwater marshes near the mouths of the streams, but with the continued demand for agricultural land the swamp forests were cleared and prepared for rice growing.

All this work was accomplished with such tools as the axe, the spade, and the hoe in the hands of the intractable negro men and women brought from the

this system the plantation flourished and an era of prosperity prevailed that the Low Country of South Carolina has yet to see again.

Beautiful homes were built on the banks of the rivers overlooking the rice plantation. Surrounded by pine forests with an avenue of oaks leading to the house, these old homes are very impressive. On the Santee the historic homes which may be viewed today are Hopsewee, Hampton, ~~Teddy~~, Harrietta, ~~Weyan~~, Anandale, Woodside, Rice Hope, ~~Dear Plantation~~, and Cat Island. Around the old plantation homes are the neat rows of slave quarters still standing. In the marshes are old chimneys, relics of a passing era. Old brick stacks at the edge of the marsh mark the location of former rice mills.

The zenith of rice planting was reached during the period from 1850- 60. The total acreage in rice in South Carolina totalled more than 70,000 acres; of this 16,660 acres or 23 % was in the Santee Delta, probably the ~~most important wintering ground on the Atlantic coast~~. A summary of the rice areas in South Carolina during 1850 to 1860 is shown in Table .

✓ Wild ducks abounded on the plantations and were such easy prey that their killing was not considered good sport. It was looked upon as "pot hunting" and the job of securing ducks for the table was usually assigned to the trunk minders.

✓ According to Heyward in his book "Seed from Madagascar"— "When the ducks came in the fall of those days, they not only came in great numbers, but they stayed in the fields day and night, for then it was the practice of the planters to flood their fields as soon as the crop was harvested and keep them flooded until late in the winter when work for another crop had to be begun. When there was a late fall, from the rice stubble a second crop would grow and mature small heads of rice, so that these, together with

the ducks. Early in November they began to pour into the fields in large flocks, and not being constantly shot at as they are now, they remained until early spring."^{1/}

Disturbance 1

1/ 1937 Duncan Clinch Heyward "Seed from Madagascar"

The problem of excessive duck population during the Civil War is illustrated by the following excerpt from a letter W. Sweet to Adele Petingin Allston, Nightingale Hall, 28th September, 1864:^{2/} "I have never seen the like of the Ducks for the season in my life as there is at N (ington)gale hall I can not keep them out of the field Doe all that I can it appiers that they will Eat up all the Rice and Knowthing to shwot them with."

2/ J.H. Esterly: "The South Carolina Rice Plantation as Revealed in the Papers of Robert H. Alston."

① With the libération of the slaves following the close of the Civil War the cultivation of rice along the Atlantic seaboard suffered its first major set back. Labor now had to be hired, and a few of the plantations have lost a fortune in slaves never recovered.

② Storms and freshets resulted in the abandonment of rice plantations when there were insufficient funds to repair the breaks in the banks and finance another crop. The most disastrous inundation by hurricane tides occurred on September 27, 1822. Over 100 persons, mostly slaves, were drowned on Murphy Island in the lower Santee Delta. The inscription on a gravestone in the Santee Churchyard states that victims of the memorable hurricane of that date are buried there. There were no other disastrous high tides until that of 1886, caused by an earthquake. Other notable high tides, hurricane induced, occurred in 1893, 1911, 1916 and 1940.^{3/}

3/ U.S. Corps of Engineers, Sept. 1942. Survey Report on the Lower Santee River, South Carolina, to determine the effects on diversion on navigation, irrigation and wildlife.

Usually accompanying the tropical hurricanes are heavy rainfalls which caused the greatest damage to the fields. High waters overflowing the fields destroyed the crops and crevassed the banks. The general winter rains also caused inundations, but they were not nearly so severe as those resulting from hurricanes.

But what really caused the decline, and finally the abandonment of rice culture on the South Atlantic seaboard was the ⁽³⁾ competition and over-production of rice in the states of Louisiana, Texas, and Arkansas. Before the Civil War the growing of rice was begun on a small scale in Louisiana on the lower Mississippi River. It was planted on tidewater lands where conditions were very similar to the Carolinas. Not until a number of years later was its production undertaken in the southwestern part of the States, on prairie lands, which extended over a large territory. Irrigation was achieved through large pumping plants. Rice spread from there to Texas and then to Arkansas in 1903. ~~Beginning about the year 1885, the growing of rice in Louisiana began to be felt by Carolina rice planters in the marketing of their crops, and each succeeding year the competition became more serious. By the use of machinery~~ the planters in Louisiana, Texas, and Arkansas grew rice considerably cheaper than could the planters of the Carolinas. Except for the reputation of the "Carolina gold rice," the only advantage of the seaboard plantations was the lower cost of irrigation and this was offset by the necessity of keeping up extensive river banks, mending breaks in the banks when they occurred, and keeping in repair the system of trunks.

From 1901 when there were 35,041 acres of rice cultivated in South Carolina, the acreage on all rivers decreased gradually until in 1939 there were only _____ acres. The decline from 1909 to 1939 is shown in Fig. ____

In the Santee Delta all of the fields were in rice until the hurricane of 1866. A considerable amount was in cultivation until the storm and fresh-

of 1908. There were a few acres planted until the diversion of the Santee and subsequent salting of the Delta in 1942. Fig. ___ shows the rice acreage in Charleston and Georgetown County from ___ to ___.

~~In the first years of abandonment, the Santee Delta, as well as all the other rice areas, probably achieved maximum performance in wintering waterfowl. Abundant rice fields were quickly vegetated in the most desirable fresh water marsh plants, such as wild rice, wampee, four-square spike rush, three-square rush, wild millet, soft stem bulrush, marsh hemp. Interspersed in these marshes were rice plantations still managing to hold on, and the rice produced by these plantations augmented the natural food supply. Almost a perfect balance between food and cover was achieved and an ideal habitat for waterfowl created.~~

The first sport shooting of significance was on the marshes near Winyah Bay, now known as the Baruch marshes, in 1890, originally owned by the Granade Gun Club and later leased to Barney Baruch. Baruch was much disturbed by an old market hunter by the name of Ball Cain, who poached in his marshes over 30 years ago. To keep him out of the marshes, Baruch, unknown to Cain, got Jeff McQuain to give Ball a job. When Ball found it out, he quit his job and went back to poaching. While spending a stretch in jail, he is known to have whittled wooden decoys, preparing for the next event.

With the coming of the hunt clubs, many of the banks were patched and the trunks put back into operation. Some rice was grown to attract ducks to the plantations and natural foods encouraged. To facilitate shooting small ponds were dug in the marsh and baited with shelled corn ~~or~~ rice. Live decoys were used and the marshes were shot from morn to night. A hunter seldom went to his blind without a case of shells. Plugging your gun was unheard of; there was no limit to the number one could shoot.

11

Subjected to such punishment ducks fed in the fresh and brackish waters at night and flew to the salt marshes at the break of day. Devil's Den just off the coast near McClellanville, now a part of the Cape Romain Refuge, was a reknown shooting area. Although it offered little food the ducks were intercepted on their morning flight from the Santee Delta marshes.

Murphy and Cedar Islands, a part of the Santee Club, and the south island marshes of South Island Plantation located at the tip of the Delta, have always afforded good shooting and continue to do so, primarily because they lie in the line of flight between the feeding and resting grounds. It should be pointed out, however, that a considerable amount of food is produced in the brackish marshes of those plantations.

Through the control of hunting in the fresh water marshes, much better hunting was achieved. On Kiawloch plantation, Camp Main was set aside as a resting area. By affording some protection ducks were held on the marsh throughout the day, and hunting success was improved.

The greatest number of ducks killed in the Delta occurred during the period from 1920 to 1928. Santee Club harvested 6,383 birds in 1921-22. Kiawloch Club bagged 3,062 ducks in 1924, 3,126 in 1927. A summary of the kill records available from the Clubs in the Santee Delta are shown in Fig.

The duck population in the Santee Delta and along the Atlantic Coast began to decline appreciably in 1928. Since 1928, the population has continued to diminish, with short periods of recovery, until the present. There were fewer ducks on the Atlantic seaboard during the winter of 1946-47 than ever before in the history of the country.

The wintering population on the Cape Romain National Wildlife Refuge has declined from 80,450 ducks in 1931 and 1939 to a population of _____ in 1946-47. In aerial coastal counts along the Atlantic Coast, 116,900 ducks were tallied in 1939-40, and 24,400 in 1945-46. During the same period the aerial

Further evidence of the decline in duck populations is evidenced by the kill records although the annual kill is influenced greatly by the length of the season, bag limit, shooting hours, and other restrictions on hunting. For instance: The kill records indicate a shortage of ducks in 1934-35, 1935-36, 36-37, 37-38. This was during the never-to-be-forgotten national duck depression, when the season was reduced to thirty days, the daily bag reduced to 10 ducks, baiting outlawed, shoots limited to 3 and shooting until four o'clock, only, and the use of live decoys prohibited. According to club managers and owners in the Santee Delta, there was no such duck depression here. There had been a decline, yes - but there was no scarcity such as exists today.

There are several reasons for the decline in waterfowl population:

1. Natural deterioration of marshes following the cessation of rice cultivation.
2. Destruction of marshes in the Santee and Cooper Rivers as a result of the construction of the Santee-Cooper hydroelectric-navigation project.
3. Reduction of the period of overflow in the Santee River flood plain below the Santee dam.
- 4. Destruction and deterioration of breeding grounds.
5. Shooting.

WILDLIFE SECTION

Appendix

History of Waterfowl Population

"Plantations of the Carolina Low Country", by Samuel Gaillard Stoney

Photographs by Miss Frances Benjamin Johnston & Mr. Ben Judah Lubschez
Published by the Carolina Art Association, Charleston, S.C. - 1938

1. The coast from South Carolina to Florida originally Spanish
2. Then settled by the Huguenots of France; two settlements, one at Charlesfort on Port Royal, the other at Fort Carolina on the St. Johns River, Florida.
3. Plantation age began in the mind of a Barbadian planter, Sir Jno. Collet
4. Scheme carried through by Lord Ashley
5. Ashley aided by John Locke
6. Ashley's first contingent of settlers set sail from the Downs in August 1669.
7. Aboard three ships were English, Irish and Welsh; picked up 3 negroes enroute, several West Indians.
8. Crews of negroes brought in; West Indians dominated population
9. Spread of population followed rivers and creeks.
10. Population advanced with a bound in 1680. Two new Huguenots and English Dissenters
11. The plantations themselves grew more or less at the expense of the Indians. The needs were the same - a marsh for landing on water deep enough to carry a canoe, a well-drained spot to live on, a spring of water, some high planting land. The patriarchs of the grove-oaks - were found about most plantation houses, had sometimes a history that goes back to Indian days.
12. Rice - hastened the spread of the plantations
13. " - believed to have been first introduced in 1686 by a ship's captain from Madagascar.
14. First low country rice fields were made in the savannahs that had been marked down for them by the explorers
15. Rice then moved to the inland swamps where they were flooded from a "reserve."
16. Indigo brought in to bolster rice in 1740.
17. A period of retrogression in rice cultivation occurred during the Revolution days.
18. Tidal culture of rice developed near George-Town by Mr. Keon Johnston in 1758.
19. Invention of the rice mill by Johathan Lucas 1790.
20. Establishment of summer villages.
21. Increase in malaria and yellow fever
22. Cotton brought in in 1786
23. In 1793, Whitney invented the cotton gin. The beginning of King Cotton and the spread of the plantation system all over the south
24. In the first days of 1865, Sherman, turning from the sea, marched his army through the southern end of the low country. Columbia was burned and Charleston evacuated. Lost battle in North Carolina.

- the Low Country plundered and ravaged by bodies of Federals and freedmen
- 25. Many homes lost by abandonment or forest fires.
- 26. Revival of Low Country. Rice again a commercial crop.
- 27. Recession of rice culture and final extinction.
- 28. "For the better part of the decade that followed the World War, the Low Country was a region of deserted fields, growing up in forest, of ragged dying gardens and grim, cold, pathetic houses, solemnly waiting their doom by fire or delapidation. But with the coming of automobiles and better roads it demanded, the country was rediscovered. The wealth of post war days set men to searching for game preserves and winter homes. The ruined rice fields and cotton lands gave these seekers land to hunt over, the plantation houses furnished them homes already equipped with the charm of time. The last ten years has seen house after house virtually raised from the dead. Now many of the ruined fields have been cleared again, river banks rebuilt, and rice planted, and it would see that the plantation of the Low Country is well on their way to new and long careers not only of beauty but of usefulness, and of an active life once more."

NOTE: Earthquake in 1886.

Lower Santee Delta

History of Waterfowl Population

Notes from "The South Carolina Rice Plantation as Revealed in the Papers of Robert W. Alston. Edited by J. H. Esterly, Professor of History, College of Charleston

Ducks: Pages 247, 298, 304, and 305

Letter from W. Sweet to Adele Petiggin Allston, Nightingale Hall, 28th September, 1864:

"I have never seen the like of the Duck for the season in my life as there is at N (inghtin) gale hall I can not keep them out of the field Doe all that I can it appiers that they will Eat up all the Rice and Knowthing to shwot them with."

Ⓐ Letter from Daniel P. Avant to Robert F.W. Alston, South Carolina Georgetown District, August 9, 1823.

"The Birds & Crows is vary Bad on the corn and the Squaril on our new ground Rice They cut it Done vary much & the summer Ducks is very thick."

The following description was given verbally by Russell Doar, owner of Doar Plantation, on May 26, 1947:

Doar Plantation: contains now 130 acres of marsh, 30 acres of which are north of county road; 100 acres of marsh below road are under partial control.

Mr. Doar formerly had 6 shooters, now only three. Shot from 200 to 250 ducks until 1945-46 season. Only 8 killed last year.

Entire Delta planted in rice until about 60 years ago (1886). A considerable amount planted until storm and freshet in 1908.

First sport shooting was on Baruch marshes about 1890; first owned by Anandale Gun Club, who had a 20-year lease. Ball Cain, a market ~~set~~ hunter, poached on Baruch's lands about 30 years ago; was given a job by J. E. McQuain to get him out of marshes; when put in jail was known to have whittled wooden decoys.

Santee Gun Club - first club in the Santee Delta; established in 1898; now holds 15,000 acres of marsh, owned by 36 members.

Kinloch Gun Club established in 1911.

With cessation of rice growing, solid stands of wild rice grew up.

Mr. Doar narrates how he shot 13 ducks in 10 minutes at sundown in 1895 on the Wicklow Plot. Worked for Kinloch Gun Club from 1914 to 1922. Shot 7 days a week and all day until dark. Very little morning shooting except in the coastal areas of the Delta. This was due to the fact that ducks were feeding in the upper marshes in the evening and night and returning to the coastal marshes to rest during the day.

The Camp Main sector was put under strict control in 1920. Protection given...some baiting; flights changed almost over night; ducks fed during the day and went to the sea at night. With a freshet ducks would leave the marshes and move up into the swamps to feed on acorns. In early days, Kinloch shot all day and part of night. By management, control of hunting, kill was increased from 1,000 to 3,000/year. In bad years hunting was down to 300. ~~Too much water made hunting bad.~~

Duck population began falling off in about 1930--gradual decline, periods of recovery - last year worst in history.

ANNS	OPEN SEASON	BAG LIMIT	SHOOTING CAPACITY	BAIT ALLOWED		DECAYS ALLOWED
				Yes	No limit	
1916-18	Nov. 1- Jan. 31	12	None	Yes	"	Yes
1918-30	" "	2	25 ducks, 8 geese	"	"	"
230-31	Nov. 1- Jan 15	15	15 ducks, 4 geese, 8 brant	"	"	"
1931-32	Nov. 16- Jan. 15	"	"	"	"	"
1932-33	" "	15	"	"	"	"
233-34	Nov. 20- Dec. 19	20	"	"	"	"
234-35	Nov. 20- Dec. 19	20	12 ducks, " Under permit	"	"	"
1935-36	Nov. 25- Dec. 25	30	10 ducks, 4 geese	No	"	No
236-37	Nov. 27- Dec. 26	30	"	"	"	"
237-38	Nov. 15- Dec. 29	45	"	"	"	"
238-39	Nov. 15- Dec. 29	45	"	"	"	"
239-40	Nov. 15- Dec. 29	45	"	"	"	"
240-41	Nov. 2- Dec. 31	60	4 geese	"	"	"
241-42	" "	60	3 geese	"	"	"
242-43	Nov. 2- Jan. 10	70	2 plus 4 blue	"	"	"
243-44	Nov. 2- Jan. 10	70	2 plus 4 blue	"	"	"
244-45	Nov. 2- Jun. 20	20	" / 5*	"	"	"
245-46	" "	80	10 " blue	"	"	"
246-47	Nov. 23- Jan. 6	45	7 ducks, 2 / 2 except " Miss. Flyway	"	"	"

* Mallard, pintail, widgeon, separately or in aggregate.

Note: Our files reveal only suggested regulations from 1915-1916.

Rice Culture in South Carolina
1850-60
(From Rice and Rice Planting in the South Carolina Low Country
By David Doar, January 1936)

River	Acres	Avg. Yield Per Acre	No. Plan- tations
Savannah (South Carolina side)	5,635	35	18
Combahee	12,591	25	34
Ashepoo	3,295	35	11
Edisto	4,970	46	9
Cooper	6,050	30	41
Santee	16,660	30	39
Black River	4,335	30	16
Sampit		25	7
Pee Dee		30	22
Waccamaw		35	27

Note: Zenith of rice planting was reached in 1850 to 1860. Of the acreage on all of the above rivers, there were only 35,041 cultivated in 1901. From 1901 the acreage on all the rivers gradually decreased until in 1920 there were only a few acres planted here, and these on different rivers, probably not aggregating more than 500 acres in all.

"Last Days of Rice Planting", by Theodore Rivenel:

"In 1860 the total crop of rice in the United States was 5,000,000 bushels and of that amount South Carolina produced 3,500,000 bushels, North Carolina and Georgia the rest."

"The True History of How the Madagascar Gold Seed Rice was Introduced into South Carolina", By A. S. Salley :

"Several years prior to 1686, the year in which Dr. (Henry) Woodward died Captain John Thurber, master of a New England brigantine, put into Charlest Town Harbor, From Captain Thurber Dr. Woodward procured about a peck of gold seed rice, which Thurber has obtained from Madagascar.***** By 1690 the production of rice in South Carolina had so advanced that the planters asked that it be specified as one of the commodities of the province with which they might pay their quit rents"".

Rice Production (From U.S. Census of Agriculture)
 (Statistics by Counties)

	<u>1944</u>	<u>1939</u>	<u>1934</u>	<u>1929</u>	<u>1924</u>	<u>1919</u>	<u>1909</u>
South Carolina	0	1,160	3,977	1,848	4,461	6,547	19,491
North Carolina						?	
Georgia						1,682	
Florida						674	

South Carolina:

	Georgetown		Charleston		TOTAL	
	No.	Farms	Acres	No.	Farms	Acres
1944	0	0	0	0	0	0
1939	79	81	43	67	122	148
1934	80	82	379	323	459	405
1929	56	108	43	91	99	199
1924	?	10	?	380	?	390

CAPE ROMAIN REFUGE

Notes from Narrative Report
September, October, November, December
By Wm. P. Baldwin

1944

Ducks.* On form NR-1 are indicated pertinent data covering fall and winter waterfowl populations on the refuge. The peak populations of all species totalled 14,000, but the total refuge population including coots, never exceeded 10,000 waterfowl at any one time.

This small number of wintering wild fowl is a definite result of the destruction of the fresh-water marshes in the Lower Santee delta. It will be recalled that the northern salt marshes of the refuge, embracing the locally famous shooting areas of "Devil's Den" and "Mill Den", were purchased to partially protect the thousands of black ducks, mallards, and pintails that fed in the fresh water Santee delta at night and rested in the adjacent salt marsh during the day. This particular flight once numbered as high as forty to sixty thousand "big" ducks, as in the winter of 1937. During the present winter the flight over this travel lane numbered less than 400 blacks and mallards. Many plantation managers on the Santee delta have reported "no ducks" this winter, although a few clubs have had good shooting on lower delta ponds and marshes protected from the salt influx.

The situation on the refuge is considered critical enough to warrant comparison with previous years. The attached table shows the estimated peak refuge population for each year since 1937, and for most years, numbers per species.

This table reflects a local progressive decline of most species of waterfowl. In the summer of 1940 a hurricane affected food conditions in the delta. During 1941 (the last season before the damming of the Santee River) the peak refuge population was 32,000 waterfowl; of this number 30,000 used the salt marsh areas of the refuge. In 1942 the diversion of water by the Santee-Cooper project resulted in the diversion of salt water on the Santee delta, destroying much waterfowl food-plants. The adjacent refuge population decreased to 23,200, only 12,500 of them frequenting salt marsh; that season, 20,000 scaup entered the salt bays of the refuge, bringing the peak population to 43,200. During the second season of Santee-Cooper operation, 1943, the salt-kill of Santee delta vegetation was worse, and the adjacent refuge population of ducks was 15,430 and 12,500 of these frequented the salt marsh. During the present season

of 1944 delta food conditions were even worse, and the refuge population was 14,000, with only 3700 ducks (2500 of them green-winged teal) frequenting the salt marsh.

When one considers that the portion of the waterfowl population which used the salt marsh areas of the refuge for resting and the Santee delta for feeding declined from 30,000 in 1941 to 3,700 in 1944 it is obvious that we have been seriously affected by operation of the Santee-Cooper project. To date, this loss has not been offset by the increasing value of our impoundments and the new ones at the Santee Refuge. As lower Santee delta vegetation types are gradually replaced by brackish-water associations, food conditions for waterfowl may improve somewhat.

Compared to the previous season this year's refuge population included a marked decrease in blacks, pintails, and blue-winged teal and hooded mergansers. A marked increase in baldpates, green-winged teal, and Canada geese was observed. Of the 2800 green-winged teal on the refuge, 2500 frequented the Ramhorn Creek section.

The peak population for the Cape Island impoundment was 1000 waterfowl (mostly pintails) and 800 coots, during the first week of November. At Bull's Island the peak population was experienced during the middle of November, when 5100 ducks were on the ponds. The peak population of wood ducks at Bull's Island was 150 in October, and by December only a few were observed.

Mr. Harold Peters, in flying over the area on October 30, observed 4500 American scoters, 250 white-winged scoters, and 250 surf scoters in the ocean off Cape Island.

<u>Species</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>
Canada Goose	None	None	27	56	111	60	83	196
Mallard	20,000	22,000	20,000	Decrease	Decrease	3,000	700	925
Black Duck	25,000	25,000	23,000	"	"	5,000	4,000	1,200
Gadwall	?	?	?	?	?	?	?	60
Baldpate	15,000	7,500	7,000	Decrease	Decrease	800	1,000	1,850
Pintail	2,500	2,000	1,500	1,500	8,000	3,000	4,000	2,300
Green-winged Teal	?	1,000	700	8,500	4,500	500	500	2,800
Blue-winged Teal	?	500	?	?	4,000	1,500	800	800
Shoveller	200	200	1	?	500	300	300	175
Wood duck	300	500	?	?	300	300	300	150
Redhead	?	?	?	?	38	10	10	9
Ring-neck	?	500	?	?	1,000	500	500	500
Canvas-back	?	25	350	50	200	300	30	35
Scaup	5,000	15,050	1,050	?	Few	20,000	500	4,000
Goldeneye	?	75	5	?	?	25	10	15
Bufflehead	600	800	850	?	Decrease	200	200	200
Ruddy Duck	200	300	200	?	Decrease	500	300	400
Kergeners	5,000	5,000	?	?	?	?	30	40
Old-squaw							1	1
Coot	<u>1,000</u>	<u>1,000</u>	<u>?</u>	<u>?</u>	<u>?</u>	<u>1</u>	<u>1,500</u>	<u>1,500</u>
Approximate Totals	74,800	81,450	61,880	37,000	32,000	43,200	15,430	14,000

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Cape Romain Refuge

Notes from Narrative Reports
September, October, November, December
By Andrew H. Dupre

1945

Ducks. - "The peak populations of all species totalled some 15,000 but the total Refuge population did not exceed 12,000 ducks at any time. *** Ducks were scarcer than at any time the Refuge Manager has ever known during the past twenty years. The vast amount of ducks that in former years used the salt marshes dwindled to a mere 3,000. *** 6,000 ducks used the impoundments and flooded woods at Bull's Island; 2,500 used the impoundments and immediately adjacent marshes at Cape Island, while only 3,500 were observed in the general marshes. These figures represent the peak Refuge wintering population during December.

1946

Ducks.- "The peak population of all species totalled 18,000, with a steady wintering population of 11,000*** a greater number of ducks than this refuge has had since the salting of the Santee Delta. This increase in ducks is due primarily to better knowledge of water control during all seasons of the year. *** Black ducks, while common throughout the refuge impoundments, were scarcer than ever known locally. Mallard were also scarcer than during any previous year.

While the refuge population of ducks was definitely better than in previous years, the local waterfowl situation was rather poor. Fewer ducks were killed this season than ever before. Many good private marshes carried practically no ducks at all. Authentic reports of attempts to bait ducks with corn without success were not infrequent. It appears that waterfowl prefer marshes well balanced with marsh and aquatic plants to artificially placed foods. A few local gun clubs had good shooting. Generally, however, the waterfowl kill was very limited.

Santee Refuge

Notes from Narrative Reports
September, October, November, December
By W. P. Baldwin

1943

Waterfowl:- "It is also believed that the numbers were not as great as last year, even at the peak in November, as none of the large lofts of scaup and ringnecks have been seen so far. The only duck that is showing up in large numbers is the wood duck, and it is believed the migrants have greatly augmented the resident birds. *** Whatever the cause, refuge observations do not indicate that any large part of the 150, million waterfowl

have stopped here, and the general statement of 'less than last year' holds good throughout."

1944

The wintering waterfowl population on Santee Refuge was almost 16,000 birds, 6,500 of which were coots. *** In 1943 the peak population was about 13,000 with 2,500 of them being coots. *** Considerable differences in the two years populations were experienced for certain species. The most notable were the great increases in coots and baldpates, and substantial increases in ring-necked ducks and hooded mergansers. *** A great decrease was observed for Canada geese, gadwall, green-winged teal, shoveler, wood duck, lesser scaup, buffle-head, and ruddy duck. Small decreases in mallards and blacks were obvious."

1945

Waterfowl.- "The wintering population at Santee Refuge, as analyzed in forms MR-1, was 13,600, a reduction from the previous winter. This was definitely the result of our loss of the Potato Creek and Jack's Creek ponds. *** Compared with the previous winter's population, there were increases this year in Canada Geese, mallards, gadwalls, pintails, green-winged teals, and shovellers. Black ducks, ringnecks, and buffle-heads were present in the same numbers, but decreases were noted this year in baldpates, blue-winged teals, wood ducks, ruddy ducks, mergansers, and coots

1946

Migratory birds.- Careful investigation shows a slight increase over last season. Birds, however, were found feeding, for the most part, in flats and potholes left by the receding lake.

Estimated Waterfowl Population
(Santee National Wildlife Refuge)

<u>Species</u>	<u>1942</u> ^{1/}	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u> ^{2/}
Geese:					
Canada Goose		120	80	250	275
Blue Goose				24	
Whistling Swan			4	1	
Ducks:					
Mallard	4	1800	1500	2500	3500
Black Duck	56	1400	1000	1000	3000
Gadwell		250	70	600	450
Baldpate	19	300	2500	800	1500
Pintail	434	500	500	1000	1200
Green-winged teal		200	50	900	400
Blue-winged teal		500	500	300	150
Wood duck	20	3000	2000	500	800
Red head				1	2
Ring-necked duck		600	900	900	800
Canvas back	10		3	11	30
Scaup	8835	700	1	20	600
Golden-eye		1			12
Buffle-head	8	1	2	20	
Ruddy duck	36	500		20	150
Shoveller		250	50	200	150
Hooded Merganser		300	100	25	
Red-breasted merganser			2	30	
Others	19	25			
Sub-total	9441	10,447	9362	9102	13,019
Coot	106	2,500	6500	4590	5,500
Grand total	9547	12,947	15,862	13,602	18,519

1/ Annual waterfowl count on January 22, 23, 1942. Flooding of reservoir began on Nov. 12, 1941.

2/ Refuge under new management.

SOUTH CAROLINA WATERFOWL INVENTORY

(1939 - 1946)

Area	1946	1945	1944	1943	1942	1941	1940	1939
Savannah Refuge	700	1,100	6,000	13,325	26,000	25,000	25,400	20,000
Combahee River	3,750	2,300	9,700	15,675	3,250	17,000	8,500	7,550
Ashepoo & Edisto	8,360	2,700	14,700	16,550	10,000	21,000	20,000	16,350
Cooper River	1,360	1,075	17,000	1,300	5,450	11,000	14,000	13,600
Santee-Cooper Project	100	6,200	2,000	-	-	-	-	-
Cape Romain Refuge	460	1,500	3,100	4,700	800	1,000	3,000	3,775
Santee Delta	8,500	14,200	5,500	13,900	14,000	28,500	33,000	17,225
Waccamaw-Pee dee Rivers	1,200	10,000	8,700	5,900	7,000	10,250	13,000	16,300
Totals	24,430	39,075	66,700	70,450	66,500	113,750	116,900	96,800
Figures Reported by State to Regional Office	25,733	39,118	66,700	100,300	95,400	150,200	200,024	207,150

(These figures were obtained by airplane, submitted in letter of Feb. 5, 1946, H.S.Peters, Flyway Biologist, Region 4, to F. C. Lincoln, Asst. Director, Washington, D.C. - copy to Regional Office, Atlanta, Georgia.

OBSERVATIONS WATERFOWL IN SANTEE - DELTA AREA

(1946 - 1947)

	December 13 1946	February 11, 1947	March 5 1947	March 27 1947
Murphy	4000	1700	2000	1500
Cedar	2000	900	1500	1200
South	9000	1000	1500	800
Totals	15000	3600	5000	3500

(Observations made from airplane by H. S. Peters, Flyway Biologist)

WATERFOWL INVENTORY
FIGURES

<u>Year</u>	<u>North Carolina</u>	<u>South Carolina</u>
1936	220,630	250,028
1937	255,801	188,756 ↘
1938	468,202	211,384 ↘
1939	763,036	207,250 ↘
1940	1,030,257	200,024 ↘
1941	939,010	166,200 ↘
1942	1,586,263	106,630 ↘ 61,223 5 203940
1943	1,274,295	100,300
1944	2,132,076	67,980
1946	609,788	25,733 ↘
1947	356,200	76,221 ↘

Summary of Waterfowl Kill Records
Lower Santee Delta

<u>Year</u>	<u>Total</u>	<u>South Island</u>	<u>Cat Island</u>	<u>Anan dale</u>	<u>Minyah</u>	<u>Kinloch</u>	<u>Doar</u>	<u>Rice Hope</u>	<u>Hopse wee</u>	<u>Hamp ton</u>	<u>Fair Field</u>	<u>The Wedge</u>	<u>Harry etta</u>	<u>Santee Gun Club</u>
1947	1,883	305	252/	502/	0	201	8	16	0	0	0	0	0	1286
1946		985				372		115						2647
1945		1021				528		256						2112
1944		931				367		147						2285
1943		1137				727		40						2212
1942	4,092	918			8	793		105						2268
1941	4,164	806			127	1000		77						2774
1940	3,631	561			95	585		31						2367
1939	3,411	504			104	690		55						2113
3212	1938	2707			186	495		5						1534
1937	2,084	391			74	390		6						1223
1936	1,701	302			210	146		1						1242
1935	2,711	518			159	465		12						1792
1934	2,567	298				1012		61						3760
1933	2,567	586				754		50						3172
1932		647				644		105						1831
1931		689				856		41						2945
1930		476				934		188						3541
1929								293						2827
1928								1343						4720
1927								2869						4406
1926								3126						5822
1925								3059						5737
1924								2412						5956
1923								3082						6388
1922														5307 -1921
														3494-1920
														3492-1919
														2550-1918

1/ On Woodsid and River Hope, Mr. Doar states that over 700 ducks were killed annually prior to 1924
2/ Estimate only - no records available

Waterfowl Kill Record
Kinloch Plantation

Game Kill
Rice Hope Plantation

<u>Year</u>	<u>Ducks</u>	<u>Doves</u>	<u>Deer</u>	<u>Quail</u>	<u>Turkeys</u>
1947	16	153	37	20	0
1946	115	717	10	11	1
1945	256	194	68	10	0
1944	147	244	87	30	0
1943	40	247	50	59	18
1942	105	482	54	?	13
1941	77	204	52	67	5
1940	31	456	51	86	5
1939	55	337	35	45	1
1938	5	58	29	21	2
1937	6	114	7	9	4
1936	1	126	7	-	5
1935	12	158	6	24	7
1934	61	36	4	-	11
1933	50	6	-	-	12
1932	105				
1931	41				
1930	188				
1929	293				
1928	322				

(The above figures are taken from logbook of Plantation)

Waterfowl Kill
South Island Plantation

<u>Year</u>	<u>Black Duck</u>	<u>Pintail</u>	<u>Others</u> ^{1/}	<u>Total</u>
1946-47	101	31	97	305
1945-46	284	64	343	985

^{1/} Made up of widgeon, gadwall, blue and green winged teal, diving ducks, etc.

Waterfowl Kill Records
Mulberry Plantation, Cooper River, South Carolina

<u>Year</u>	<u>Total</u>
1940	331*
1939	381
1938	359
1937	296
1936	147
1935	238
1934	177
1933	217
1932	836
1931	962
1930	805
1929	1093
1928	887
1927	1363
1926	1151
1925	1010
1924	1496
1923	909
1922	1545
1921	667
1920	825
1919	292
1918	263
1917	229

(*) Composed of the following: Pintail, 170
Green-winged teal 48
Blue-winged teal 16
Shoveller 38
Black 14
Gadwall 15
Ring-neck 12
Widgeon 10
Mallard 8

Summary of Costs of Ducks Bagged
on
Kinloch, South Island, and Santee Gun Club Marshes

<u>Clubs</u>	<u>Ducks Killed</u>	<u>Average Cost</u>	<u>Total</u>
Kinloch	201	\$54.15	\$16,517
South Island	305	65.90	20,100
Santee Club	<u>1286</u>	<u>24.80</u>	<u>31,895</u>
Subtotal	1792	38.23	68,512
Other clubs	91	38.23 ^{1/}	3,823
TOTAL	1883		\$72,335

1/ Average for all clubs used.

Average National Costs of Ducks Bagged in
United States

1946-47

Total Expenditures ^{1/}	\$300,000,000
Total Kill ^{2/}	14,000,000
Average Cost per duck	21.42

1/ Figures obtained from paper by Dr. Clarence Cottam, entitled:
"Waterfowl at Crossroads", presented at 12th North American
Wildlife Conference, San Antonio, Texas, February 3, 1947

2/ From statistics distributed by Director Albert Day at various
wildlife conferences.

S A N T E E C L U B

1421 Chestnut Street
Philadelphia 2, Pa.

Confirmation of
AIR MAIL

June 16th, 1947.

Mr. C. Gordon Fredine, Regional Supervisor,
River Basin Studies,
U.S. Fish & Wildlife Service,
526 Ten Forsyth St. Building,
Atlanta 3, Georgia.

Dear Mr. Fredine:

Your letter of June 4th reached my office after I had left on a business trip to Texas from which I have just returned.

From the Club's game record books I have prepared the enclosed record of waterfowl kill running back to 1901, the first year for which a record was kept. It is a fact that Santee Club was incorporated in 1898 but the shooting records were not kept until 1901. As you and I know, such a record of mere total kill would not tell the entire story and I am sorry that I cannot give you the number of gun days involved in each season which is what you really need to show the average per gun per day.

The other requested information needs explanation, and I am answering your questions as follows:

Marsh	18,000 acres
Swamp Woodland	2,000 "
Upland	5,000 "
Estimated Total Acreage	<u>25,000</u>

Lands under water management before diversion can be approximated as 13,000 acres.

Lands under water management three years after diversion can be approximated at 13,000 acres with the note that only partial control was possible.

✓ We soon found after diversion that banks which had been adequate for control when there was fresh water outside the banks, became inadequate when the percentage of salinity in the water outside the banks rose so materially in the three year period after diversion.

#2.

At present we believe we have 9700 acres under what could be considered effective control, plus 2700 acres on Cedar Island (north of the South Santee River and east of the Intracoastal Canal) under partial control, and we have lost any semblance of control over Blackwood (250 acres) and River Row Fields (200 acres), both of which were originally under complete control.

We rate our new dikes on which construction was started in 1945 as the equivalent of 14 miles of complete bank, but this includes a considerable mileage on Cedar Island which is thus far only half the proper final height and hence does not represent control.

I enclose a map which is not to scale, but which was prepared at the time we were advising our members of the new bank building program which we call our Marsh Protection Program.

Area I accounts for some 2700 acres and is known as Blakes-Ormond Hall. This work was done first because it needed less new bank to complete protection than any other single area.

Area II, Big and Little Murphy Islands, we rate as 7000 acres and this is now under effective complete control.

Area III, Cedar Island, is only under partial control, but when our Program is complete this will add another 2700 acres under complete control.

Though I believe Supt. Mercer probably told you a good deal about our duck planting program, it seemed appropriate to include a little information about this in this letter. Long before baiting was outlawed we had our marshes surveyed and tried a considerable number of different kinds of duck foods. We soon learned that widgeon grass and nut grass were the two duck foods which did best in our marshes and we have been concentrating on these for many years.

Though we have saved a very considerable marsh area and have been able to grow an increasing amount of duck foods, it is a fact that some of our marshes are mere expanses of mud flats, and this is due to the killing of marsh growths by salt water. We believe that we can bring back even these seriously damaged areas by extension and completion of our marsh bank system.

I hope this will reach you in time to serve your purposes, and I am sorry that I was away and hence unable to send you the information earlier.

Very truly yours,

M A D + L

2 -XXXXXX-

526 Ten Forsyth Street Building

June 18, 1947

Mr. Edward Manigault
The News & Courier
Charleston, South Carolina

Dear Sir:

Thank you very much for your letter of June 17 and records enclosed. The information you have given us is very helpful and we sincerely appreciate your cooperation.

Very truly yours,

C. Gordon Fredine
Regional Supervisor
RIVER BASIN STUDIES

LML

THE CHARLESTON EVENING POST
EVENINGS EXCEPT SUNDAY ESTABLISHED 1894
EVENING POST PUB. CO., PUBLISHERS



The News and Courier
EVERY MORNING ESTABLISHED 1803
THE NEWS AND COURIER CO., PUBLISHERS

CHARLESTON, F. S. C.

BUSINESS OFFICE

June 17, 1947

JUN 18 1947

Office of the Regional Director
U. S. Fish and Wildlife Service
526 Ten Forsyth Street Building
Atlanta, 3, Ga.

Attention: Mr. C. G. Fredine

Gentlemen:

Yours of June 4 addressed to my brother, the late Robert S. Manigault, owner of the Winyah tract in the lower Santee, Georgetown County, was delayed in reaching me. However, since I am one of the administrators of Mr. Manigault's estate and also the owner of a nearby tract of land in Georgetown county badly affected by the salting caused by the erection of the Santee-Cooper hydroelectric project, I am taking the liberty of filling the forms addressed to my brother.

As to the effect of the hydroelectric project on the land used in the region under discussion, I can only say that according to my observation it has been extremely unfortunate. The salt sea water now penetrates the lower Santee, according to the season, to a very considerable distance, and great and damaging changes have been wrought.

First, the agricultural and grazing potentials of the area have been largely destroyed. Second, Pine and hardwood growths in some areas have been killed by the encroaching salt water. Third, there has been disruption of fresh water fisheries traditionally belonging to the lower Santee since the region was first settled. Fourth, an outstanding winter habitat of game waterfowl has been rendered inoperative.

Thank you for your communication and please do not hesitate to call upon me if I can be of further service.

Yours very truly,

Edward Manigault
Edward Manigault

M/r
CC-2
The News & Courier
Charleston, S. C.

WATERFOWL KILL

Winyah and Newland tracts, Santee Bay,
Six Mile Creek Plantation

1947 —
1946 —
1945 —
1944 —
1943 —
1942 8
1941 127
1940 95
1939 104
1938 186
1937 74
1936 210
1935 159
1934 —
1933 —
1932 —
1931 —
1930 —
1929 —
1928 —
1927 —
1926 —
1925 —
1924 —
1923 —
1922 —
1921 —
1920 —

E. Manigault
The News and Courier
Charleston, S.C.

XZXZXZXZXZX

526 Ten Forsyth Street Building

July 17, 1947

Mr. B. B. Reath,
Secretary-Treasurer
Santee Club
Philadelphia, Pa.

Dear Sir:

Thank you very much for your letter of June 16 and the records furnished us. The information you have given us is very helpful and we sincerely appreciate your prompt cooperation.

Very truly yours,

C. Gordon Fredine
Regional Supervisor
RIVER BASIN STUDIES

LAND USE IN LOWER SANTEE DELTA

BEFORE AND AFTER DIVERSION

- a. Winyah and Newland tracts on North Santee
 b. Romney tract on South Santee

PLANTATION

<u>Lands Under Water Management</u>						Miles of New Walls Constructed
Total Area (Acres)	Marsh	Savanna	Upland	At Maxima Dissipation	At Present	
a. 1400	1000	—	400	approximately 1000 acres submerged by salt tide		
b. 350	50	—	300	approximately 50 acres submerged by salt tide		

Due to crevasses in the embankments the lowland areas of the above tracts have been open to the free flow of the lower Santee tide for many years, but potential land uses

Remarks: for agriculture and grazing have nevertheless been not inconsiderable. The fresh water of the river charged with silt deposits from the upper regions of the state gave sweet-ness and richness to the soil and fostered valuable growths that invited stock-herding and the presence of wild game.

The writer has hunted waterfowl in the lower Santee with regularity since the fall of 1915 and until 1942, the year that witnessed the initial operations of the Santee-Cooper hydroelectric project, there were no "duck depressions" there. The writer has records of duck kills in the lower Santee section going back a good many years but ending in 1942, when hunting in that locality except in a few flooded ponds or fields became to all intents and purposes a profitless pastime.

In its previous condition the lower Santee provided a winter feeding and resting ground for a concentration of waterfowl estimated by competent observers to number not less than 100,000. In its present state it is hardly likely that the same area is capable of supporting more than a very small percentage of that number. Encroaching salt water has destroyed the wild rice (*Zizania*) of excellent food value to wildfowl, and much of the lowland has either been rendered unproductive or has been taken over by the common salt tide grass (*spartina*) of the Atlantic coast, attractive only to marsh birds such as the various herons and the clapper rail.

E. Manigault, po' fisher,
 The News and Courier, Charleston, S.C.

Waterfowl Kill

SANTEE CLUB

In Delta of North and South Santee Rivers in Charleston and Georgetown Counties,
South Carolina

1947	1286
1946	2647
1945	2112
1944	2285
1943	2212
1942	2266
1941	2774
1940	2367
1939	2113
1938	1634
1937	1223
1936	1242
1935	1792
1934	3760
1933	3172
1932	1831
1931	2945
1930	3541
1929	2827
1928	4720
1927	4722
1926	4406
1925	5822
1924	5737
1923	5956
1922	6388
1921	5307
1920	3494
1919	3492
1918	2550
1917	2675
1916	3872
1915	3027
1914	3133
1913	3093
1912	5053
1911	4476
1910	4581
1909	4222
1908	3384
1907	2623
1906	3250
1905	3313
1904	3613
1903	3002
1902	3400
1901	2910

CARL P. DENNETT, PRESIDENT
48 MILK STREET
BOSTON 8, MASS.

WILLIAM CLARKE MASON, VICE-PRESIDENT
123 SOUTH BROAD STREET
PHILADELPHIA 2, PENNA.

DANIEL E. POMEROY, VICE-PRESIDENT
230 PARK AVENUE
NEW YORK 17, N. Y.

B. B. REATH, 2ND. SECY & TREAS.
1421 CHESTNUT STREET
PHILADELPHIA 2, PENNA.

SANTEE CLUB

MICCLELLANVILLE
CHARLESTON COUNTY
SOUTH CAROLINA

TELEGRAMS AND EXPRESS MATTER
SANTEE CLUB
VIA GEORGETOWN, D. C.

TELEPHONE
GEORGETOWN 40-L-3

PLEASE ADDRESS REPLY TO:

1421 Chestnut Street
Philadelphia 2, Pa.

AIR MAIL

June 16th, 1947.

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CARL P. DENNETT, PRESIDENT
MILK STREET
ON S. MASS.
WILLIAM CLARKE MASON, VICE-PRESIDENT
123 SOUTH BROAD STREET
PHILADELPHIA 2, PENNA.
DANIEL E. POMEROY, VICE-PRESIDENT
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SANTEE CLUB
VIA GEORGETOWN, S. C.

SANTEE CLUB

MCLELLANVILLE
CHARLESTON COUNTY
SOUTH CAROLINA

TELEPHONE
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PLEASE ADDRESS REPLY TO:

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I hope this will reach you in time to serve your purposes, and I am sorry that I was away and hence unable to send you the information earlier.

Very truly yours,

B. B. Reath. #

STATEMENT OF CLAIM AGAINST SOUTH
CAROLINA PUBLIC SERVICE AUTHORITY.

with respect to

RICE HOPE PLANTATION

(Including Legrange, Farm Hill, White Oak and Moorland)
GEORGETOWN COUNTY.

Location. Rice Hope Plantation (including other plantations under the same ownership) is situated in Georgetown County on the North Santee River and its tributaries. A small part of this property extends North of U. S. Highway No. 17, but the greater part of it lies on both sides of the North Santee River from the crossing of U. S. Highway No. 17 Eastward, part of the property being on the mainland and part on the Delta.

Ownership. The property is owned by Rice Hope Plantation, a corporation. The stock in the corporation is owned in greater part or in its entirety by William H. French.

Description of property. The mainland section of Rice Hope Plantation proper fronts for a short distance (between 1,000 and 1,500 feet) on the North Santee River. This plantation is watered principally, not by the river, but by a small creek sometimes known as White Oak Creek, that constitutes its western boundary, and by an artificial canal, that constitutes its eastern boundary and separates it from Woodsides Plantation, the property of Russell Dowd. The rice fields lie between the creek and the canal. Another section of Rice Hope Plantation consists of rice fields located on the Santee Delta.

White Oak Plantation is located west of Rice Hope Plantation. The mainland section of White Oak has a substantial frontage on the North Santee River, and also a substantial frontage on White Oak Creek, that in its upper reaches becomes a swamp.

known as White Oak Swamp. White Oak Plantation also has additional rice fields on the Santee Delta extending as far south as Six Mile Creek.

Yawn Hill Plantation lies west of White Oak and has upland and rice fields on the mainland side of the river and rice fields on the Delta extending westward to and across Highway No. 17.

Legrange Plantation has upland areas on the mainland side of the river, but no rice fields there. It has rice fields on the Delta, lying on both sides of Highway No. 17.

Woorland Plantation is detached from the other properties, and lies eastward of them on the Delta, extending through the Delta from the North Santee to the South Santee. It consists entirely of Delta rice fields.

All of this land was diked with substantial dikes, reaching above the normal high water level of the river. These dikes protected both the rice field areas, and the upland areas back of the rice fields, from invasion by water, and gave control over the height of water. The existence of the dikes contributed materially to the value of the property. A large part of the value of this property was found in the duck shooting that it furnished.

Invasion by salt water. All of these plantations have been invaded by salt water. The salinity extends as far west, approximately, as the crossing of U. S. Highway No. 17; but is greater on the lower parts of the plantation than at the highway crossing. The salt water has invaded the river because of the construction of the dam by South Carolina Public Service Authority.

Damage from Salt Water. The invasion of salt water has resulted in substantial damage to all that part of the property lying along the river, and all that part of the property lying along tributaries to the river, and along artificial drainage canals reaching back from the river. The result of this salting of the water has been that the salted area of this property has been destroyed as duck shooting grounds because of the destruction of duck food; the dikes have been eroded, due principally to the killing of the vegetation growing thereon; and the salt has infiltrated the soil in all areas near the river, and near the tributaries of the river, with disastrous results to all vegetation, the roots of which were touched by the salt water.

Length of Dikes. A computation has been made of the length of dikes that it will be necessary to rebuild to protect this property from salt water. On Rice Hope property, Legrange, Farm Hill, and White Oak, the length is 62,040 feet, more or less. On Woodland, the length is 29,370 feet, more or less. This gives a total of slightly over 90,000 feet of dikes.

In order to control the water within these dikes, when built, it is estimated that it will be necessary to install a number of rice field trunks or floodgates.

While fresh water for the rice fields on the mainland could be obtained from the back country, yet in order to supply fresh water for the fields on the Delta, it would be necessary to sink artesian wells and to install and maintain gasoline pumps, one for each of these wells. The number of wells would depend very largely on the flow obtained from each of them.

Amount of Damage. The damage to Rice Hope plantation property, including the other several tracts now in the same ownership, is estimated to be the cost of restoring fresh water conditions

-4-

by rebuilding the destroyed dikes and doing the other
incidental work.

RICE HOPP PLANTATION

By as Attorneys.

May 1, 1947.

Land Use in Lower Santee Delta By Plantations - Before and After Diversion

Plantation Preserve	Total Area	Marsh	Swamp	Woodland	Land Under Water Management			Miles Protected
					Before	After	* At Present	
South Island - Tom Yawkey, Owner Jim Gibson, Mgr.	25,000	15,000	2,000	8,000	2,000	3,000	5,000	30
Cat Island - Mrs. Ramsey, Owner Bennet Wiegans, Mgr.								2½
Anendale - Mrs. Early, Owner C.T. Broughton, Mgr.								
Winyah Gun Club or Rocheille - Maniganet, Owner Issach Michael, Mgr.	1,750	1,050	-	700				
Kinloch - Eugene & Eug. E. duPont Owner T. C. Lucas, Mgr.	7,904	5,848		2,056	5,648	None	5,648	5
Richard Standland, Ass't. Mgr. T. C. Lucas, Mgr.								
Woodside - Russell Doar, Owner & Manager	130				130	100	100	
Rice Hope - Mr. N. Beach, Owner Lee, Mgr.								
Hopsewee - Int. Paper Co., Owner (Mr. Donham - owner of house)								
Hampton - Archibald Rutledge, Owner Prince Alston, Mgr.								
Fairfield - Josephine Pinckney, Owner The Wedge - Chas. Woodward, Owner Glover, Mgr.								
Harrietta - Mrs. Abney, Owner John Verone, Mgr.								
Santee Gun Club - O. W. Mercer, Mgr. Other Lands	25,000	18,000	2,000	5,000	13,000		9,700	14

(*) Three years after diversion.

Cost of 1286 Ducks Killed by Santee Gun Club
1946-47

I. Equipment and Investment

A. Marsh Land:						
13,000 acres improved marsh land @ \$30	\$390,000					
5,000 acres unimproved marsh land @ \$2	10,000					
Interest - \$400,000 @ 4%	<u>100,000</u>					
	\$16,000					
B.						
14 miles new dike @ \$2,100	29,400					
Interest - \$29,400 @ 4%	1,176					
Amortization - \$29,400 @ .655	192					
Maintenance - 14 miles at \$105	1,470					
	\$2,838					
C. Buildings, boats, etc.						
Interest - \$40,000 @ 4%	1,600					
Amortization - \$40,000 @ .655%	262					
Maintenance - \$40,000 @ 2%	800					
	2,662					
II. Management of Marshes						
13,000 acres @ .25¢ per acre	3,250					
	3,250					
III. Per diem						
214 gun days @ \$20.	4,280					
	4,280					
IV. Travel						
35 members, 1000 miles each-35,000 miles @ 5¢	1,750					
	1,750					
V. Supplies						
35 members @ \$25. each	875					
	875					
VI. Miscellaneous						
35 members @ \$5 each	175					
Total cost of bagging 1286 ducks	175					
Ave. Value per Duck	\$21.80					
	\$21.80					
	<u>175</u>					
	<u>\$31,830</u>					

Cost of 305 Ducks Killed on South Island Plantation
1946-47

I. Equipment and Investment

A.	Marsh Land;	2, ¹ / ₂ 0,000 acres improved marsh @ \$30 ^{2/}	\$60,000
	13,000 acres unimproved marsh @ \$2	26,000	\$66,000
		<u>86,000</u>	
	Interest - \$86,000 @ 4%	\$3,440	\$3,440
B.	30 miles new dike @ \$2,100	63,000	
	Interest - \$63,000 @ 4%	2,520	
	Amortization - \$63,000 @ 0.655%	412	
	Maintenance - 30 miles at \$105	3,150	6,082
C.	Buildings, boats, etc.	1/ 50,000	
	Interest - \$50,000 @ 4%	2,000	
	Amortization - \$50,000 @ 0.655%	328	
	Maintenance - \$50,000 @ 2%	1,000	
II.	Management of 5,000 acres of marsh @ \$1		5,000
III.	Per Diem		
	50 gun days @ \$20 per day	1,000	1,000
IV.	Travel		
	5,000 miles at 5¢ per mile	250	250
V.	Supplies		
VI.	Miscellaneous		
	Total cost of bagging 305 ducks (Annual expenditures)		\$20,100
	Average value per duck		\$65.90
	1/ Only a fraction of total investment in buildings has been assigned to duck hunting		
	<u>2/ Before construction of 30 miles of dikes.</u>		

WILDLIFE SECTION
Santee River Delta

Notes from U.S. Corps of Engineers

"Soil and Water Salinity Tests in the Santee River Delta, South Carolina, 1941-1942."

(Note: Santee Dam closed and flow reduced to 500 c.f.s. on April 24, 1942)

Series 1 to

Results obtained from soil and river water samples taken in the Santee River Delta in cooperation with the Corps of Engineers during 1941-1942: The samples were collected from various plant associations by digging a hole about the plant roots to obtain water in which the plant roots were actually growing at such times that the surface of the soil was covered by tide water from the river. Samples from the river were collected from the surface and bottom at established stations along the river. Tests made in the field. Titration method used.

First nine samples taken in salt marsh on Drum Island near the mouth of the South Santee River below and extending into the eastern limit of Spartina cynosuroides, a plant usually found bordering the banks of tidal streams from brackish to fresh situations. It is evident that this particular plant will withstand a salt content of the soil approaching two-thirds the salinity of the ocean, although its most extensive stands are found in practically fresh water marshes. (Nov. 13, 1941)

Sample taken from the west end of Grace Island in the salt-marsh zone in the beginning of the salt water and fresh-water tension zone, and in the tension zone between salt (brackish) water and fresh water: This spot on the South Santee River marks the limit of salt-water tolerance of such fresh water species as Zizania aquatica, Zizania miliacea, Peltandra virginica, Pontederia cordata, Sagittaria latifolia, Scirpus validus, and Scirpus californicus.

A series of soil water samples were collected on the south shore of the South Santee River near South-Santee-River U.S.E.D. location No. 1 just below the salt-marsh-fresh water tension zone: The location is approximately due south of the western top of Grace Island. At this location Scirpus californicus, a fresh water species, makes its first appearance on the south shore of the South Santee River.

→ Plants found dying on May 23, 1942: Sagittaria, Peltandra, Pontederia, Wildrice, and others.

Sample No. 126: Soil water sample taken on eastern side of Goat Island near edge of Spartina alterniflora belt in a plant association containing 43% Zizaniopsis miliacea; 42% Zizania aquatica; 5% Peltandra virginica; 3% Sagittaria latifolia, and 2% Spartina alterniflora. Marsh elevation, 3.0 feet above low tide.

	<u>11/15/41</u>	<u>4/7/42</u>	<u>5/23/42</u>	<u>7/8/42</u>
Salinity	3.7%	1.0%	11.3%	24.0%

Tests in the "300" series were made in what last year (1941) was an absolutely fresh-water marsh, and the tests were not made there until after the reduction of fresh water flow in the Santee River to 500 c.f.s. or less on April 24, 1942. On May 22, 1942, when the tests were made, the salinity of adjacent North Santee River was 18.5-47.5%.

Prior to diversion, the Blackwood Marsh soil was absolutely fresh. On May 23, 1942, when the "400-409" series were tested, the surface water of the adjacent South Santee River at Blackwood Wharf was 22. - - 56.3% water.

The following soil water salinity tests were made in the marshes of various plantations in the Santee Delta after the reduction of flow in the river had been reduced to 500 cubic feet per second on April 24, 1942.

Rice Hope Plantation.- East side of the North Santee River opposite the U.S.E.D. No. 5 sampling station in the middle of the North Santee River. The marshes on this plantation have been poorly managed for the production of natural foods for waterfowl. The marshes have been diked since colonial days and the dikes filled with trunks or water control structures, to let water into the marshes at high tide in the river, or out of the marshes into the river at low tide, as desired. So far as could be determined, the dikes and control structures are still operative. The original purpose of the dikes and water control structures was the commercial production of cultivated rice, but for many years comparatively very little cultivated rice has been grown on this or other plantations in the Santee Delta. The areas on which rice formerly was grown have been utilized in recent years almost solely for the production of various species of native wild plants that serve as food for waterfowl, particularly ducks.

On the whole, insufficient water is held on the Rice Hope Plantation marshes for the maintenance of desirable herbaceous vegetation that serves for duck food and for the prevention of the marshes from invasion by woody species, such as maple, alder, and ash. On June 4, 1942, the water level in the marshes was 6 inches below the surface, too low for the continued maintenance of the following herbaceous species growing there: Eizania aquatica, Orontium aquaticum, Pontederia cordata, Peltandra virginica, Polygonum sp., Zizaniopsis miliacea, Sagittaria latifolia, Juncus effusus, Cladium jamaicense, Eleocharis quadrangulata, Saururus cernuus, Carex sp., Hibiscus oculiroseus, Rubus sp., Scirpus americanus, and Stirpus validus. There is no physical reason why more water cannot be retained on these marshes, as the dikes seem to be in good condition and the water control structures are operative. Furthermore, the main intake structure is about opposite U.S.E.D. Salinity Sampling Station No. 5, in the North Santee River where there is a tide range of more than 5 feet daily, and the water at this point is fresh, even with the flow in the river reduced to 500 c.f.s.

Rice Hope Sample No. 1: Soil water sample collected in a clump of wildrice in the north field near dike with water table 6 inches below the surface of the marsh:

6/4/42

7/21/42

* Kimlock Plantation: Owned by the Dupont Brothers, is situated along the North Santee River, opposite U.S.E.D. Salinity Station No. 5 in the North Santee River. This is one of the most important waterfowl properties in the Santee Delta, and the marshes are better managed than most for waterfowl. The marshes are critically situated in relation to invasion of salt water since the reduction of flow in the Santee River to 500 c.f.s. The marshes contain fresh water vegetation, and the salinity of the surface and soil water is too high for the propagation and maintenance of these plants. Valiant attempts are being made to keep the salt water out of the marshes and the cultivated rice fields, but at high tide, when water could be let into these fields, the river water instead of being fresh as it normally was in the past, is approximately 50% sea water. Furthermore, the small dikes and water control structures lack great quantities, of salt water through holes made by mice, snakes, crustaceans, etc. The only remedy for this condition is new, larger, and water-tight dikes that will hold rain water and keep out salt water. The water control structures should also operate to let in fresh water from the river during times of freshets when such water is released at the Santee Dam. Normally, this plantation supplied enormous quantities of waterfowl foods in the form of seeds from large areas of Scirpus americanus (in pure stands) Zizania aquatica, and cultivated rice, and winter browse from the green tender shoots of Peltandra virginica, Oronitum aquaticum, and Pontederia cordata. The destruction of this fresh water vegetation by salt water will be a major loss to waterfowl along the Atlantic Coast and cannot be replaced. Salinity samples range from 1.2% to 17.8%.

South Island Plantation: This large plantation is owned by Mr. Tom Yawkey, Boston, Mass., and is operated as a waterfowl shooting area, several thousand acres in extent. The Island is east of the Intracoastal Waterway and bordered on the north by Winyah Bay, on the east by the Atlantic Ocean, and on the south by North Santee Bay. The impounded marshes and ponds are typical brackish, the principal plant species being Ruppia maritima in the ponds and Scirpus robustus. For some reason not understood water is kept out of the impoundments at high tide, and large acreages of Ruppia maritima are dead or dying because of the lowered water levels by evaporation and run off at low tide. Thinking this was the results of a mistaken notion that water too salty for the growth of the plants would be let in at high tide from the North Santee River, I informed Mr. Gibson that the river water would not be too salty for the plants in question. He remarked that water of high tide in the North Santee was too low since closing the Santee Dam to let in the impoundments. This is not true, because tide guages of the Army Engineers show no change in water levels at high tide since the closing of the dam. Anyway, this plantation borders on the ocean, of which the tides remain normal. Any changes brought about by the reduction of flow in the Santee River will have no effect on the marshes or ponds of the South Island Plantation. Salinity of the surface water in ponds from 30 to 36 on 6/4/42.

Cat Island Plantation.- This plantation is just west of the South Island Plantation and separated from it by the Intracoastal Waterway. The vegetation of this area, however, is composed of typically fresh water forms. There is one large field planted in cultivated rice. Salinity tests in 6/13/42 ran from 13.4% to 24.3%. Water lilly was dying. Water too saline for cultivated rice and evidence of salt injury was noticeable

on wildrice, Pontederia, etc.

The Wedge Plantation.- This plantation is on the south side of the South Santee River. The marshes are diked, and a considerable acreage was in cultivation of rice in 1941. In anticipation of salt water invasion, this year no rice was planted. Water from the river has been kept out of the marshes this year because of the fear of saltwater damage to fresh water vegetation, but this is a mistake, for the plantation is situated only a short distance below U.S.Highway No. 17 bridge, where the water does not get too salty for fresh water vegetation with the 500 c.f.s. flow. At present, the water in the marshes is saltier than river water, because of evaporation, but even this is not too salty for the growth of fresh water vegetation. These marshes should be managed as usual so as to take advantage of the tides. Salinity tests on 6/5/42 ranged from 4.2% to 6.2% water.

Santee Club Plantation.- This property consists of many thousands of acres of upland and marsh, both salt and fresh, and extends from the upland to the Atlantic Ocean. The main waterfowl marshes where shooting is done are situated between the Intracoastal Waterway and the ocean. Salinity tests were made in these marshes where the extensive pure stands of Scirpus robustus and Ruppia maritima indicate the normal brackishness of the area. In my opinion these areas will not be adversely affected by the reduction in flow of the Santee River to 500 c.f.s. Other fresher areas west of the Intracoastal Waterway, however, will be greatly damaged by the change to a saline condition. The marshes under consideration include those between the Intracoastal Waterway and the Atlantic Ocean --those around Murphy Island and Ocean Pond. These marshes are diked, with the main water control intake leading from Alligator Creek. The marshes are being injured this season by keeping low water in them and not permitting water to enter from Alligator Creek. This has caused abnormally low water levels inside the dike system and the low water to be saltier than usual from evaporation and plant transpiration. The seeding of Scirpus robustus is proportionate, for example, to the amount of water standing over the marsh surface. Where there are two inches or more of water, the seed production is ideal, but where the water table is appreciably below the surface there is little or no seed production. On the other hand, some small areas of cattail have been killed by the salt water. It will be noted that water inside the dike is 35% and that outside in Alligator Creek is 44% sea water. The Santee Club Superintendent was informed of this fact and advised to raise water levels inside the dike by intake from Alligator Creek.

On 6/5/42 salinity tests ranged from 14.4% in Alligator Creek near mouth intake canal leading to water control structure controlling water levels in the diked Ocean Pond marsh system to 35.4% in a surface water sample taken from canal inside diked Ocean pond marsh system near water control structure at Alligator Creek. On 7/23/42 salinity tests ranged from 38.4% to 44.0%.

SALINITY TESTS - SANTEE DELTA

<u>Sample</u>	<u>Tide</u>	<u>Salinity*</u>	<u>Location</u>
1		25.9	Judy Field, Kinloch Plantation
2		14.1	Richfield Island Field
3		23.9	Pleasant Meadow Creek
4		38.7	Anondale - East of Road
5		34.5	Anondale - West of Road
6		38.9	Anondale Rice Mill - Open Ditch
7		31.6	House Field - Winyah Gun Club
8		50.6	Alligator Creek and S. Santee River
9		59.8	West end of Grace Island
10		69.2	Barren Mud Flats, near Brant
11		77.6	E. End of Grace Island
12		47.5	Waterway and N. Santee
13		14.4	S. Santee, opposite Little Island
14		51.9	N. Santee River - Crow Island wharf
15		35.3	Middle Canal - E. Crow Island
16		32.9	Middle Canal - W. Crow Island (Boat landing, ^{tide} Flood)
17		91.1	Crow Island - S.E. end
18		30.0	Collier Creek, Harietta Plantation
19		24.8	June Field - Harietta Plantation
20		34.5	Pine Field, Duck pond - Harietta Plantation
21		31.5	Six-mile Creek - Sagittaria
22		25.8	Six-mile Creek - Main Canal
23	High	24.2	Garfish Creek
24		8.8	Field - Head of Garfish (surface soil water)
25	High	8.4	Head of Garfish Creek - open water
26	Surface Water	3.7	Field between Garfish and Six-mile Creeks
27	High	12.84	Six-mile Creek - adjacent fresh field above
28		26.12	Field - Pleasant Meadow, zone of demarkation
29		7.9	Pleasant Meadow Creek
30	Medium	21.64	Below 2nd Tributary, P.M. (<u>Scirpus v.</u>)
31	Low	5.63	Collins Creek - Harietta Wharf
32	High	14.1	Doar Field, Doar Plantation
33	High	8.8	Woodside Canal, pp(1)
34	Medium	21.3	Richfield - S.E. Kinloch Plantation
35	Medium	20.4	Kinloch Creek - opposite #3
36	Medium	26.9	Doar Point Field - opposite #4
37	Low	8.6	Intake on Camp Main - Kinloch Plantation
38	Low	10.6	Inside Camp Main Field - Kinloch Plantation
39	Low	1.6	Doar Point Field (Soil water) Sp. Validus
40	Low	6.7	Kinloch Creek - Rice Hope Landing
41	Low	6.5	Rice Hope in House Field
42	Low	1.6	White Oak Canal - Rice Hope Plantation
43		44.7	Yawkey Reserve No. 1
44		32.0	Yawkey Reserve No. 2
45		69.5	Santee Bay Pond

(*) Percent of sea strength.

SALINITY TESTS - SANTEE DELTA (Continued)

<u>Sample</u>	<u>Tide</u>	<u>Salinity*</u>	<u>Location</u>
46		51.4	Yawkey lower pine field
47		70.4	North Santee Bay
48		22.5	Upper Pine field
49		48.9	Wheeler Basin
50		29.4	Sand Creek - Yawkey
51		10.2	House field - Cat Island
52		60.2	Open Ditch - Cat Island
53	High	32.5	Wharf 1, diked field - Murphy Island
54	"	43.1	Outside diked field above - Ditto
55	"	13.2	West of spoil bank - Alligator Creek
56	"	113.7	Salt marsh - Cedar Island, Opp. Cedar Sta.
57	"	88.0	Ditch dividing Salt Marsh & Corn marsh - Cedar Is
58	"	70.4	S. Santee River at Cedar Sta.
59		32.9	Wicklow Field - adjacent Intra Canal (Downstream limit of <u>Scirpus validus</u>)
60		52.8	Ditch on N. Santee R. to Crow Isl.
61		46.2	Opp. mouth of Atchinson Creek (<u>Scirpus Americanus</u> dieing)
62	"	44.0	Cork Creek, Minum Isl.
63	"	56.3	Minum Crk. field, near branch below Cupola (Some <u>S. validus</u> but dying. <u>Typha angustifolia</u> thriving)
64	"	45.7	Minum Crk. Br., below Cupola (corn grass dying on banks - oysters)
65	"	50.6	Minum Crk. - 500 yds upstream from mouth. (Corn grass dying) dying
66	"	63.36	Mosquito Creek at Cat Island boat house (Corn grass dying)
67	"	58.96	Duck Crk. between Little Crow and Big Crow (corn grass dying)
68	"	65.1	Portion Minum Isl. opp. Kimloch Isl. (<u>Scirpus Americanus</u> and <u>Typha</u> dying)
69		51.0	Motfield Canal, Kimloch-diked Cedar Is. <u>americanus</u> (good health stand S. /
70	"	32.73	Intracoastal & No. Santee (solid corn grass)
71	"	12.0	Santee Gun Club - diked field east of Intracoastal (solid corn grass)
72		53.6	South to Santee River. Opp. field above
73		35.20	Field open to tide on south side of S. Santee
74		9.8	opp. Little Island
74		9.8	South Santee 1/2 mile below bridge
75		20.8	Field on South Santee 3/4 mi. above bridge
76		2.3	South Santee opposite Island
77		3.9	Head of St. Creek, South Santee
78		8.4	Head of Saint Creek (field)
79		1.9	South Santee Ri. at Saint. (3/4 mi. above bridge)
80		4.8	Old field opposite Hampton Island

Salinity Tolerance

(From notes of the U.S.Engineers ,
Charleston, S.C.)

1. <u>Dorrichia frutescens</u>	103.5 to 52.8%	
2. <u>Salicornia europaea</u>	98.9 to 71.5%	
3. <u>Spartina alterniflora</u>	65.4 to 1.5%	Saltmarsh cordgras
4. <u>Juncus roemerianus</u>	69.5 to 1.5%	Needle grass (3-)
5. * <u>Scirpus robustus</u>	-- 68.5 to 4.0%	- Saltmarsh bulrush
6. Aster sp.	67.9 to 12.8%	
7. <u>Solidago sempervirens</u>	67.9 to 3.2%	
8. <u>Baccharis halimifolia</u>	65.8 to 52.8%	
9. <u>Spartina cynosuroides</u>	65.8 to 1.5%	Giant cordgrass
10. <u>Limonium carolinianum</u>	65.2 to 4.4%	
11. <u>Sagittaria falcata</u>	32.9 to 9.7%	
12. <u>Pluchea camphorata</u>	27.5 to 2.9%	
13. <u>Zizaniopsis miliacea</u>	25.5 to 1.4%	Giant cutgrass
14. * <u>Scirpus californicus</u>	16.7 to 2.3%	- Bulrush
15. * <u>Pantederia cordata</u>	14.8 to 2.6%	- Pickerel weed
16. * <u>Scirpus validus</u>	14.8 to 2.3%	- Bulrush
17. * <u>Uronitium aquaticum</u>	14.8 to 1.0%	- Golden club (Arrow
18. <u>Typha angustifolia</u>	14.2 to 8.8%	Cattail
19. * <u>Scirpus americanus</u>	13.9 to 1.6%	- 3-square (fresh wa
20. * <u>Sagittaria latifolia</u>	12.5 to 1.0%	Arrowhead
21. * <u>Zizania aquatica</u>	11.3 to 1.0%	Wild rice
22. * <u>Peltandia virginica</u>	10.5 to 1.4%	Wampee
23. * <u>Acnida cannabina</u>	7.2 to 5.0%	Marsh hemp
24. <u>Polygonum</u> sp.	7.2 to 1.4%	Smart weed
25. * <u>Cyperus</u> sp.	6.7 to 2.6%	Sedge
26. * <u>Hydrocotyle</u> sp.		Pennywort
27. <u>Cladium jamaicense</u>	4.5 to 2.6%	Sawgrass
28. <u>Rumex</u> sp.	2.6 to 1.0%	- Spikerush
29. <u>Eleocharis</u> sp		Spikerish

(*) Important waterfowl food plants.

PUBLIC HEARING held October 10, 1935, at House Assembly Chamber, Columbia, S.C., regarding "The Natural Physical Features of the Site of the Proposed Santee-Cooper Power and Navigation Project and the Effect of the Project on Wildlife, especially in the Santee Basin."

Attended by 31 interested people. Representatives included:

S. C. Game and Fish Commission, A. A. Richardson
Santee Gun Club, T. C. Lucas

American Audubon Society

U. S. Biological Survey - C. Cottam, Arthur R. Young

S. C. Fox Hunters Association

3 other gentlemen - representation unknown

All other representatives from state geologists, power companies, etc.

Senator Byrnes made reference to an exhaustive hearing held by the Federal Power Commission before the license was granted.

Exhibit "B".- Letter from President Roosevelt endorsing plan on basis work program

Exhibit "C".- Letter from A.A.Richardson, overwhelmingly endorsing plan.

Exhibit "D".- "Hydroelectric Reservoir and Wildlife Conservation" by Havilah Babcock, Professor of Extension Department, University of South Carolina; endorsing Santee-Cooper Project on basis of Lake Murray.

F. L. Lee, Engineer, Columbia, questioned Mr. Richardson as to loss of habitat. Explanation made by Richardson.

Senator Jefferies.- "to promote wildlife rather than to injure it".

Arthur R. Young.- (Santee Gun Club) Predicts the effect of salt water intrusion on waterfowl foods.

Exhibit "F".- Letter from T. Lucas giving unfavorable mention of the reservoir.

Exhibit "G".- A statement regarding the effect on wildlife of the proposed Santee development by Alexander Sprunt, Jr., Audubon Society. Opposes construction of dam.

Exhibit "H".- Statement from Dr. Clarence Cottam - U.S.Biological Survey.
Exhibit "I".-

Exhibit by Georgetown, requesting lock in Santee Dam.
Roberts, point out increased flows on the Cooper and its damage to

Exhibit "L".- News item by M. D. Nesmith.

Exhibit "M".- Memorandum from Neil Hatchkiss- "However, it does not appear to be positively detrimental to wildlife in general, it seems unwise for the Biological Survey to actively oppose it."

F. T. Turner, President of the Santee Hardwood Sawmill: "We are logging that territory of the Santee Region that lies downstream from the old Santee Canal to the Atlantic Coastline Railroad." (about 25,000 acres). Started logging in 1928; flood stage at 12 feet; water gets over land and wildlife run into adjacent pine lands; points out how wildlife will be protected from floods.

Alonzo B. Seabrook comes forward at the request of Jefferies. Seabrook testifies that wildlife will be benefitted by the elimination of floods. Also, that fresh water in the Cooper would greatly benefit ducks. Summarizing, Seabrook states: "It will have no effect on wildlife because it is near Wambau and Cape Romain Sanctuaries, and up above dam there is the Congaree and Wateree swamps to take care of wild life.

Ravenal, who had raised rice on the Cooper, stated that rice farming would be improved by greater flow of fresh water.

Williams testifies that wildlife will be improved.

Other exhibits include letters and telegrams from owners of plantations on the Cooper, opposing the project.

Manuscripts in U. S. Engineers File

Soil Salinity Tests in the Santee River Delta, South Carolina.
Nov. 13-18, 1941 - 149-218.

Soil Salinity Tests in the Santee River Delta, South Carolina.
Nov. 18-26, 1941 - 149-218

Soil Salinity Tests in the Santee River Delta, South Carolina.
Nov. 13-18, 1941 1-218 , 300-409

February 5, 1946

Director, Fish & Wildlife Service,
Washington, D.C.

Dear Sir:

Attention Mr. Lincoln.

For the past nine consecutive waterfowl inventories I have covered the coast of South Carolina by plane. Comparison of the numbers recorded in these years shows an alarming decrease in the numbers of ducks found. I believe you will be interested in the following figures, showing the numbers observed by plane in the different parts of South Carolina's coast.

Area	1946	1945	1944	1943	1942	1941	1940	1939
Savannah Refuge	700	1,100	6,000	13,325	26,000	25,000	25,400	20,000
Combahee River	3,750	2,300	9,700	15,675	3,250	17,000	8,500	7,550
Ashepoo & Edisto	8,360	2,700	14,700	16,550	10,000	21,000	20,000	16,350
Cutter River	1,360	1,075	12,000	5,750	11,000	11,000	14,000	13,600
Santee-Cooper Proj.	100	6,200	2,000	(1,200)	1,300	5,450	-	-
Cape Romain Refuge	460	1,500	3,100	4,700	800	1,000	3,000	3,775
Santee Delta Area	8,500	14,200	5,500	13,000	14,000	28,500	33,000	17,225
Waccamaw- Santee R.	1,200	10,000	8,700	5,900	7,000	10,250	13,000	18,300
Totals	24,430	39,075	66,700	70,450	66,500	113,750	116,900	96,800

Figures are given for only eight of the nine years because we did not records by rivers the first time. In the past three years we have felt it best to use only the aerial coastal count for the state's inventory figures. Some juggling of numbers was required in the earlier years to get down from the too-high totals obtained by a corps of scattered observers in the state before we settled down to the aerial coastal count. However, I feel that these figures show a very good picture of our actual populations for the past years. It is indeed alarming to note the gradual decrease in our waterfowl population. We certainly gave complete coverage to the coastal areas the past few years especially. I hope returns from other states may indicate a steady decrease in South Atlantic coastal states over the past few years.

Atlanta office
J.H.Zeigler

Sincerely,

Harold S. Peters,
Atlantic Flyway Biologist.

ON REPLY REFER TO,

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Santee National Wildlife Refuge
Manning, South Carolina

October 25, 1945

Regional Director
Fish and Wildlife Service
310 Glenn Building, Atlanta 3, Georgia

Attention: Mr. Roy Moore.

Dear Sir:

I am returning the map of the Cooper River and Colonel Larsen's letter of October 19 discussing their plans of channel improvement. It is thought that this is very definitely a job for the men on River Basin Studies. If they wish to investigate the river we can give them assistance in the form of outboard motors and boats and trucks, although we have no inboard boats left at this refuge.

I am familiar with the upper Cooper River to some degree, but do not know the lower river. Doubtlessly, Mr. DuPre at Cape Romain would be in a position to help your men on an investigation also, as he knows the general area.

A more serious study is suggested because the Cooper River is lined with plantations having marsh front used for waterfowl hunting. These are generally owned by wealthy men, who will expect to see their interests protected. Dredging will have considerable effect, for on the upper river it will be difficult to find adequate spoil disposal areas without filling up some duck marshes. Furthermore, the straightening of the river near Dean Hall, Strawberry Landing, The Bluff, and other sites will put some marshes on backwater; in this country the result of such action is usually the eventual creation of "dead water" and subsequent mud deposit. This would affect water intake into diked marshes on such backwaters. The whole situation is further complicated by the fact that Santee-Cooper discharge has so raised the Cooper River water level that drainage of many of the marshes is impossible and they are changing from marsh to pond species. A study by your regional office men is needed to properly evaluate conditions.

Very truly yours,

William P. Baldwin
Refuge Manager

S. A. R. C.
e. e. - Baldwin

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CC: DuPre

Very truly yours,

W. P. Baldwin
William P. Baldwin
Refuge Manager

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October 22, 1945

Mr. William P. Baldwin, Refuge Manager
Santee National Wildlife Refuge
Manning, South Carolina

Dear Mr. Baldwin:

I am sending you a copy of a letter dated October 19 from Colonel Larsen, Acting District Engineer, at Charleston, and a map from the Survey Report for Navigation and Power Development, Charleston Harbor to Pinopolis Dam. The letter and map are self-explanatory.

Can you give us information on which to base a reply or report on this proposed project with reference to fishery and wildlife resources? Do you think it necessary that our river basin study crew make a study of this project before we prepare a report on the subject, which would be transmitted to the Army Engineers?

Very truly yours,

Attachments

ROY MOORE
Acting Regional Director

RM:ST

UNITED STATES DEPARTMENT OF THE INTERIOR
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
OFFICE OF REGIONAL DIRECTOR
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Гончарова
Васильевна
Мария Степановна
Андреева
Лидия Григорьевна
Кондакова
Елизавета
Сергеевна

MEMORANDUM to River Basin Survey Group, Regional Office, Atlanta, Ga.

FROM W. P. Baldwin, Manning, S. C.

SUBJECT: Future dredging of the Cooper River, S. C.

With reference to a recent inspection of the Cooper River with Messrs. Surber and Booth the data below are submitted for whatever value they may have in preparing a report on this survey. Remarks for certain sections are included.

Sections 5 and 16: The trip down the Cooper reemphasized the great extent of damage done to this formerly good waterfowl area by the construction of the Santee-Cooper project. Where there were formerly 30 to 40 miles of good rice-field and brackish marshes bordering the river there exist today only about five miles of good duck marsh. Considering the inundated marshes of the lower Cooper and the salted marshes of the Santee delta it is little wonder that the local wintering waterfowl population has decreased from several hundred thousand to perhaps fifty thousand in this section, although increasing everywhere else in the United States.. The scarcity of waterfowl foods at present in that triangular section of South Carolina formed by the Santee-Cooper reservoirs, the Santee basin, and the Cooper basin, cannot help but have continuing serious effects on the Atlantic Flyway duck flight. It follows that any extensive depositing of dredge spoil on those Cooper River marshes still existing will reduce just that much more the feeding areas available for waterfowl, with no good adjacent alternative feeding grounds available.

Most of the marshes are in private ownership, which results in most of it being shot over by a few and posted against the general public. This has the effect of partial refuge, wherein the waterfowl are protected during much of their four-month stay. Those marshes on the upper river owned by such men as Dotterer, Herrin, Roosevelt, and Carpenter are still being "managed" for waterfowl after a fashion, despite the problems arising from increased pond depths and unsatisfactory drainage. This increase in pond levels through the lack of diked-marsh drainage into the raised Cooper River current is generally resulting in changes from marsh habitat favoring blacks and mallards to the open pond habitat favoring coots, widgeon, and ring-necks.

On the upper Cooper, from the S. C. Highway 64 down to Wapoola Creek, the dominant marsh vegetation in diked and undiked marsh is the "white-marsh" (Zizaniopsis miliacea). It is in the diked marshes and ponds of Gippy and Lewisfield Plantations that one finds the best waterfowl habitat right next to the river. Here are some good ponds of pondweed (Najas guadalupensis) still existing, and others with a mixture of lotus, white waterlily, alligator-weed, smartweeds throughout the "white-marsh" and cattail. In this same area the Willow Grove marsh, near Gippy, filled with a worthless spoil-bank from previous dredging is a good example of what must be avoided as much as possible in the future. If necessary and possible it would be better to pipe spoil from the river back into the second-growth swamp-bottom forest that backs the upper river marshes. Furthermore, if any future dredging undermines the present dikes on the upper river the damage to these marshes will be complete.

Around Mulberry Plantation one finds Cladium jamaicense appearing in the marsh association, along with scattered patches of Spartina cynosuroides. When Rapoolla Creek is reached on the downstream trip one finds the start of the flooded marshes, formerly old-diked rice-fields whose banks could not be raised high enough to keep out the increased flow from Santee-Cooper. It is here that former saline effect can be seen in the traces of Spartina alterniflora and S. cynosuroides still holding on. Tidal action is still felt here, although the waters are completely fresh to the taste, and on the flood tide little marsh can be seen. Along the edges, and when the tide is lowest, some waterfowl feeding area is available.

It is below the Seaboard Airline RR bridge that the salt-marsh species of Spartina and Juncus roemerianus become common. At the East Branch of the Cooper one finds small patches of Scirpus robustus and Zizania aquatica, both good waterfowl food-plants. There are some areas of fair to good waterfowl marsh here, but much is nullified by the continual high river water preventing the luxuriant marsh growth of old. On most of that covered with Juncus and Spartina between East Branch and Charleston spoil deposit damage would be limited. Such damage would be most severe in the fresh-water associations on the upper river, particularly in the few marshes still diked.

If the U. S. Army Engineers' claim that existing purchased spoil areas will care for future dredging little protest can be made. If, however, considerable acreage would be covered with spoil it should be brought to their attention. The necessity for protecting every existing acre of good waterfowl marsh in the Southeast cannot be overemphasized, considering the overall waterfowl problem.

Section 9: As mentioned, the present value of the Cooper River basin as a waterfowl area is far below that of pre-Santee-Cooper days. At one time a large flight of waterfowl frequented these marshes. The impounding of 160,000 acres of fluctuating reservoir waters at the head of the Cooper River has not provided one per cent of the feeding areas destroyed on the Cooper and Santee. The black and the mallard and the pintail have suffered most on these rivers. The planned improvements by the adjacent Santee National Wildlife Refuge may someday compensate for a fraction of this loss, but substantial success will come only through an embryonic farming plan, the results of which are still problematical.

In conclusion, if future dredging of the Cooper River results in large additional spoil areas replacing present waterfowl marshes the effect on the remaining waterfowl flight through the triangular Santee-Cooper basins will be severe. If such spoil deposits are small the effects can be minimized. It should be remembered, however, that once a dredging program for ocean vessels is started political pressure will be brought to keep the channel deepened, which can only result in subsequent dredgings. This would lead to the eventual ruination over a fifty year period of the whole Cooper River basin for waterfowl.

W. P. Baldwin

William P. Baldwin
December 6, 1948

Rec. Stimulation
Sum. Col. / 100
For 1st Convalesc. of
Ortho by Convales.

(Aug)
2000

18000

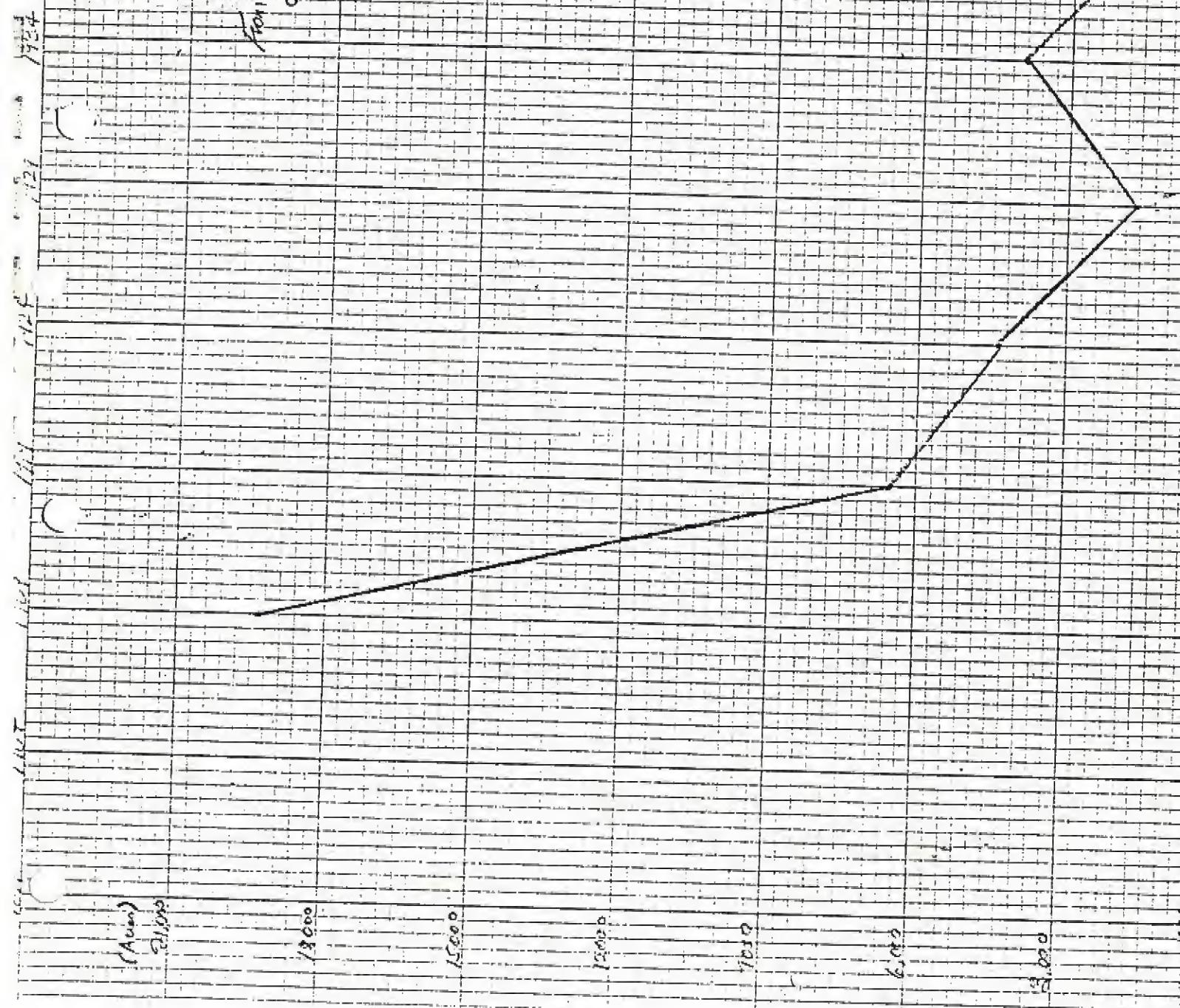
15000

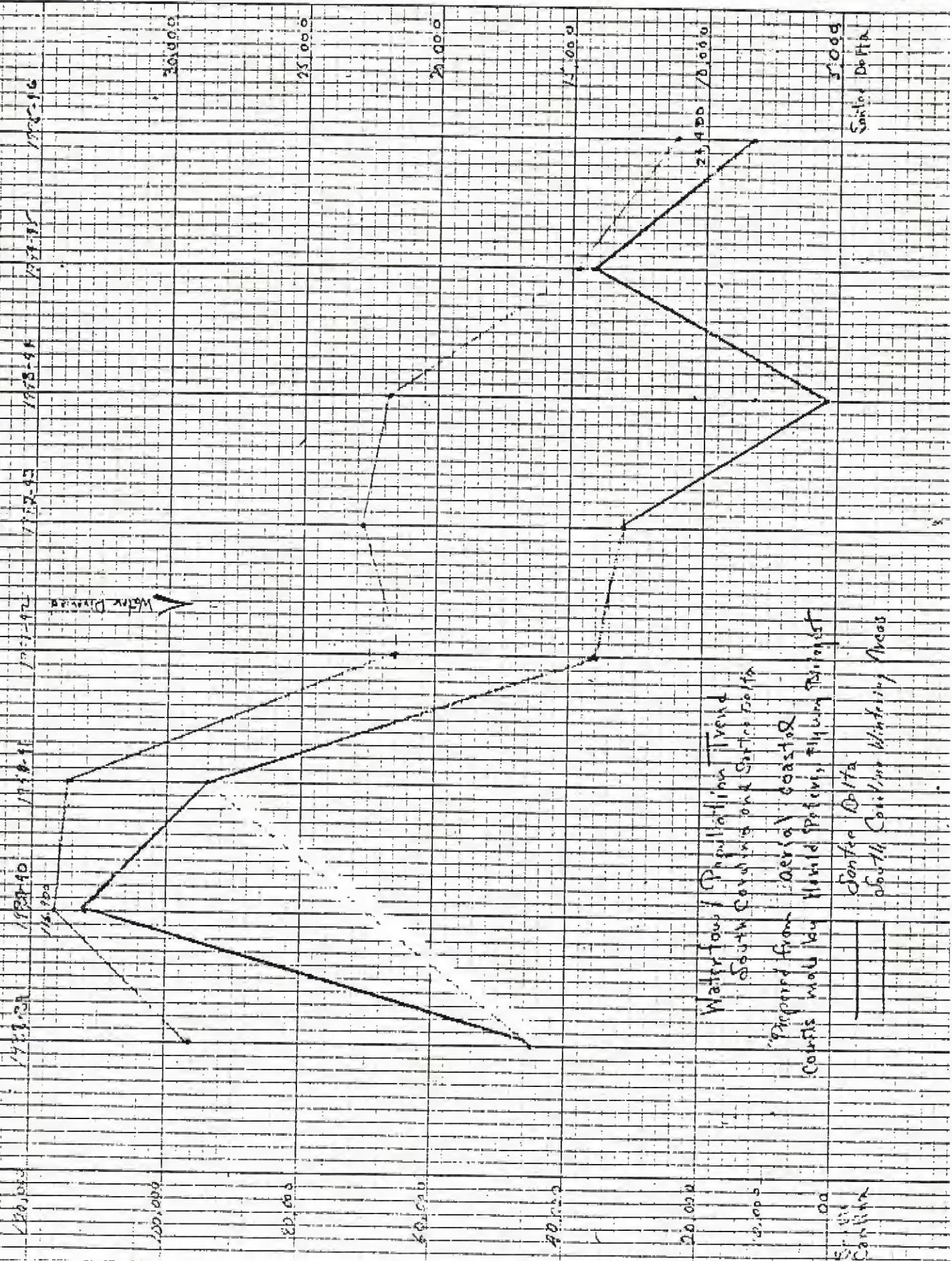
12000

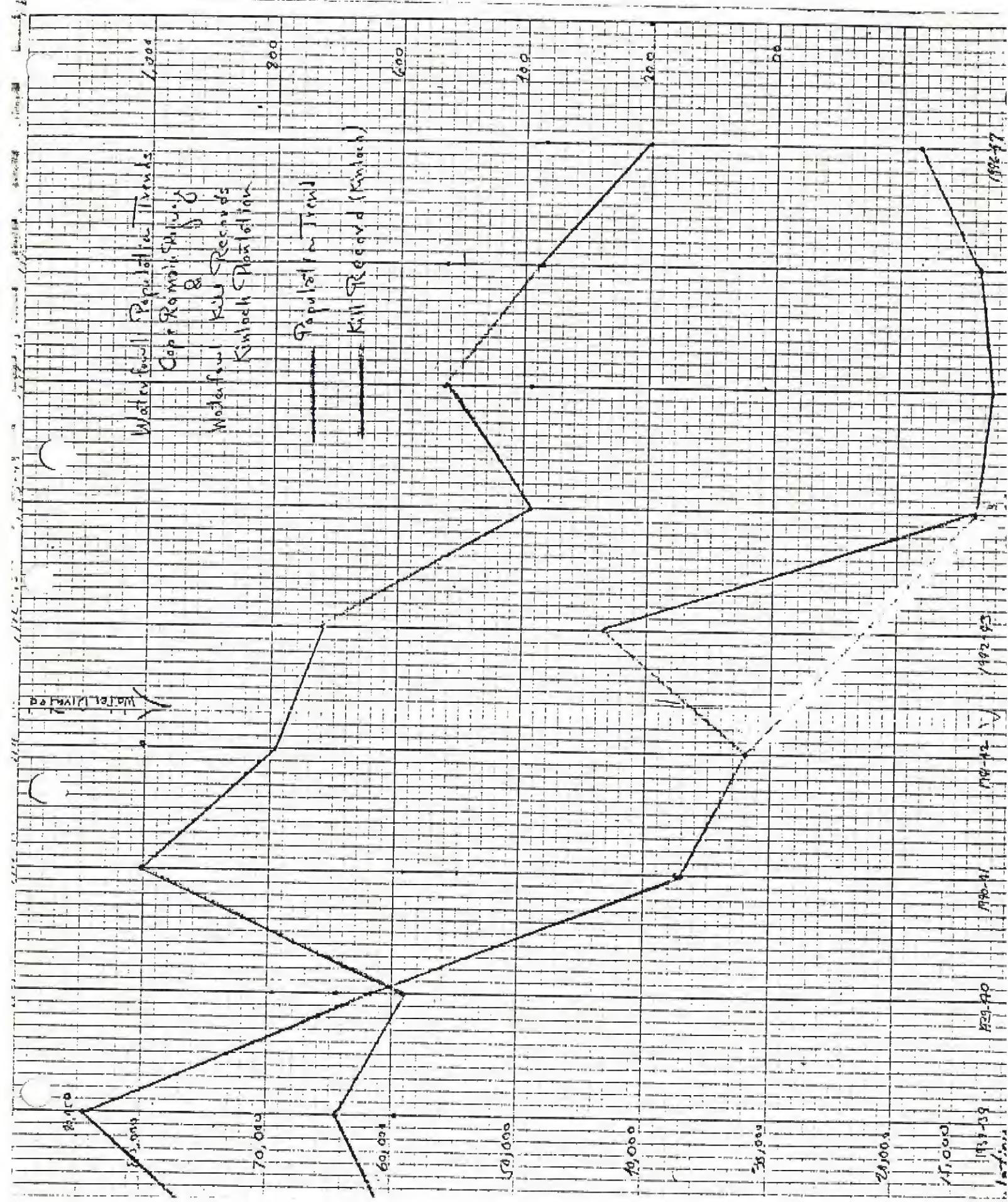
9000

6000

3000



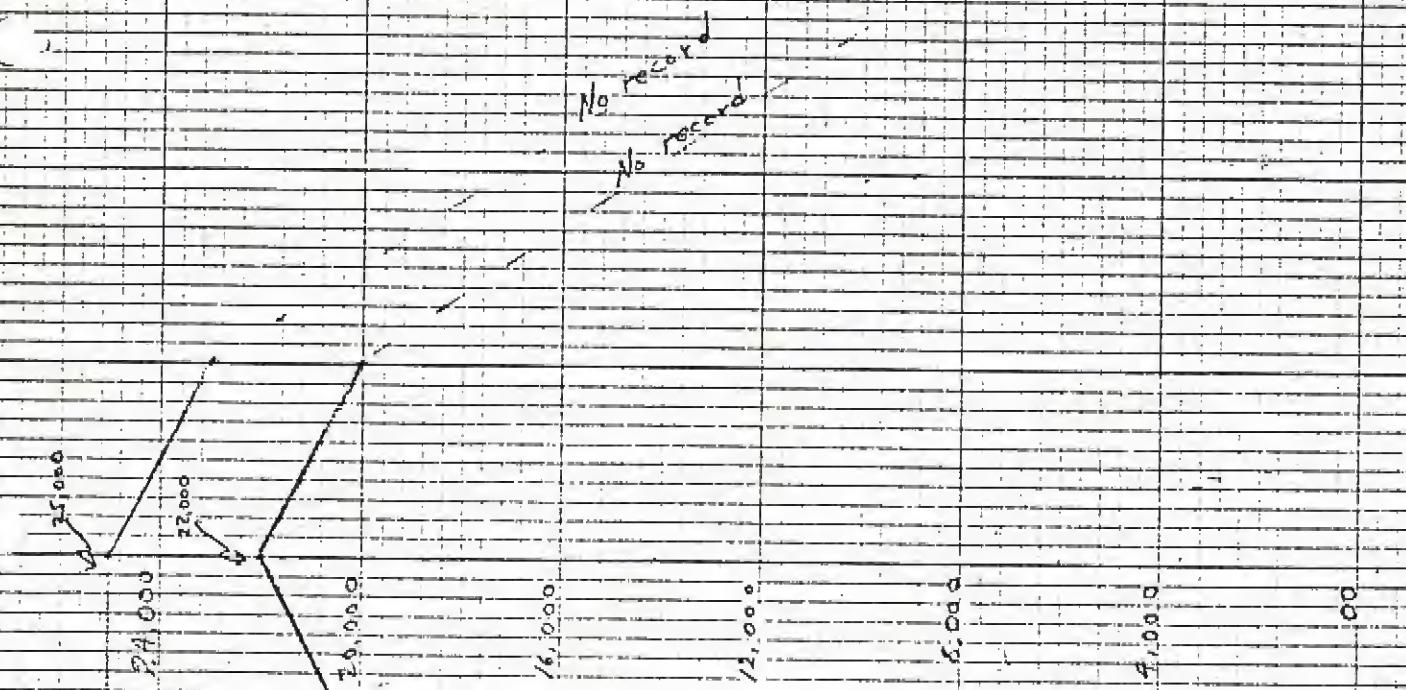




1/2/1956 210' Slat Dm & Pallets
Cape Town, C.P.R.
Arr. Pipe Shuttles

Block Docks.
Mallard Ducks.

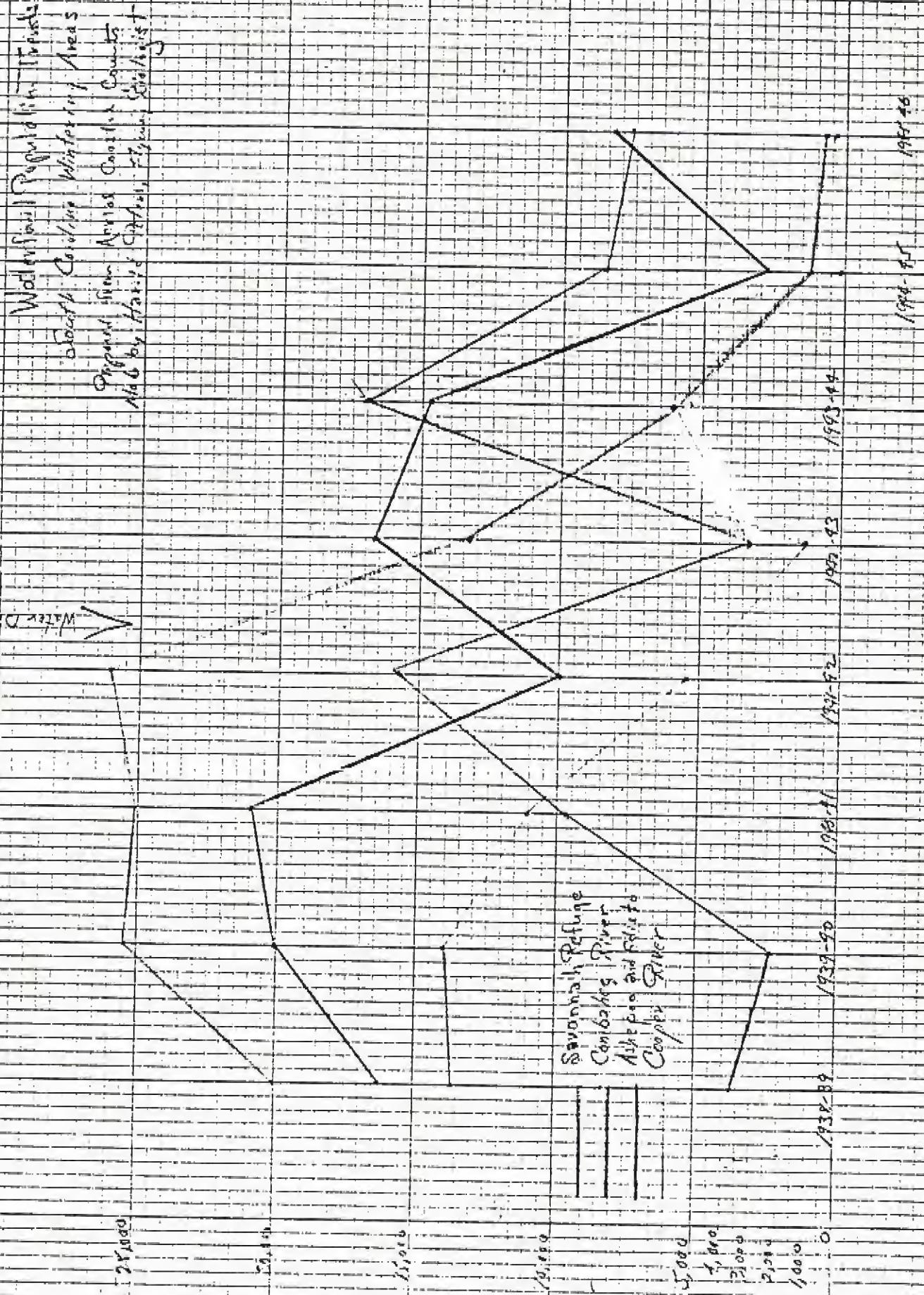
EWTC Division



Ward's Pond Fishery Trends (4)

Stocks & Prices

1960-61 1961-62 1962-63 1963-64 1964-65



20,000

25,000

Quinton

Goon

10,000

5,000

2,000
1,000

89

1931-89

1931-71

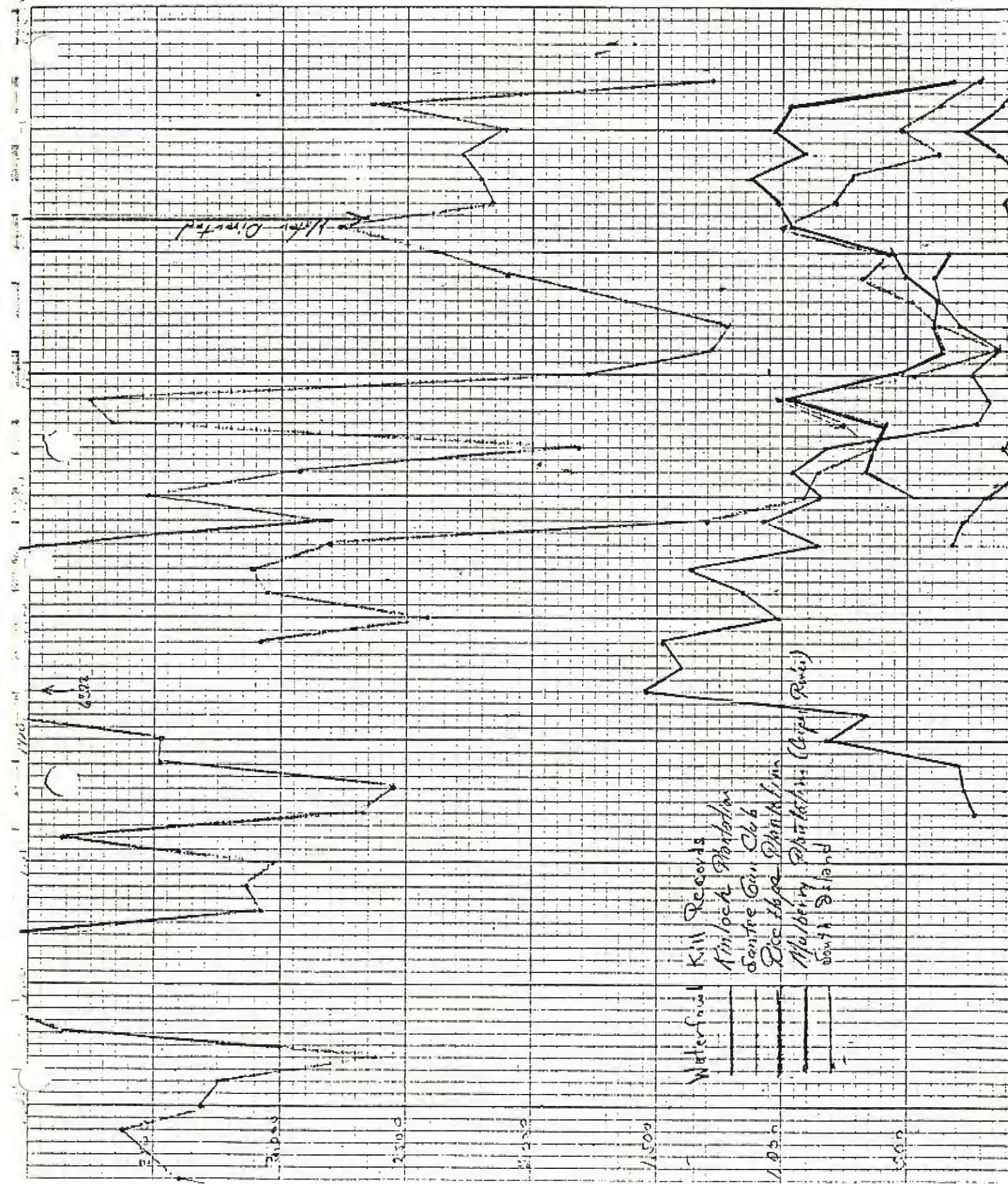
1931-92

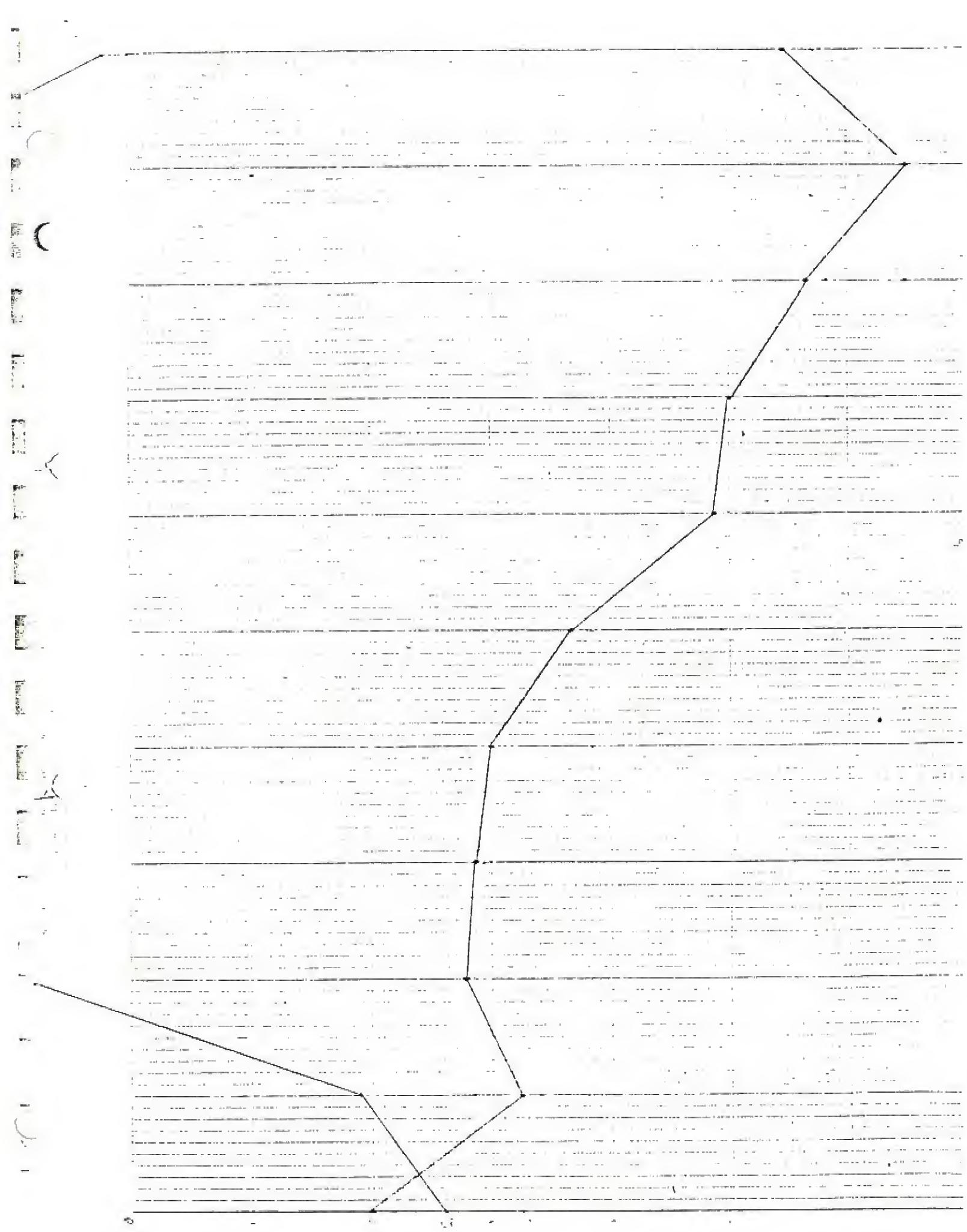
1931-32

Waterfowl Population Trends (E)
South Carolina Wading Bird
Avian
Delta Coast & Coastal
Counties, May 1931
Reported by Frank S. Smith, May 1931

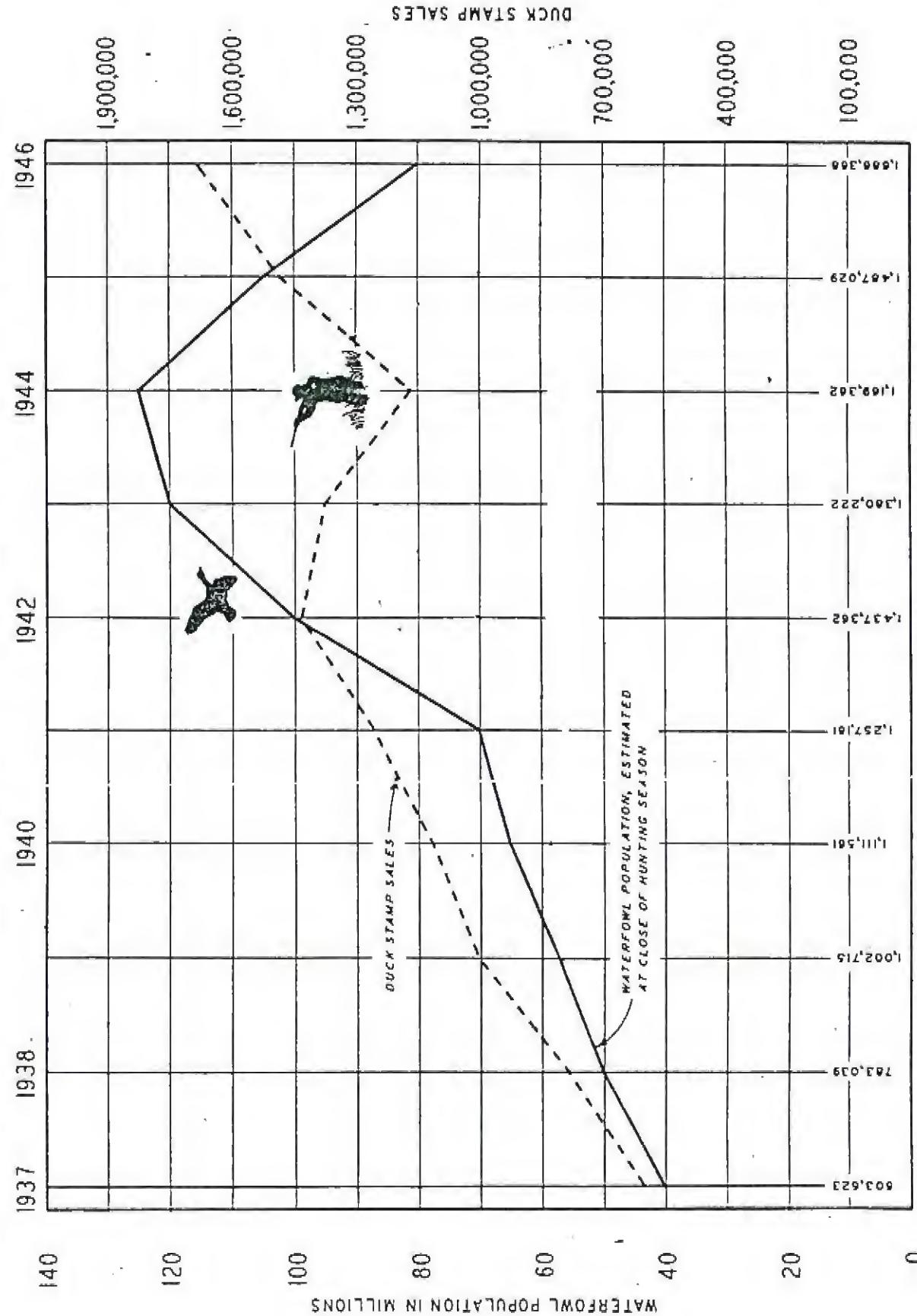
Santee Delta
Waccamaw River
Cape Romain Refuge
Savannah - Coopers Reservoir

Wader - Delta Island





WATERFOWL POPULATION VERSUS HUNTING PRESSURE



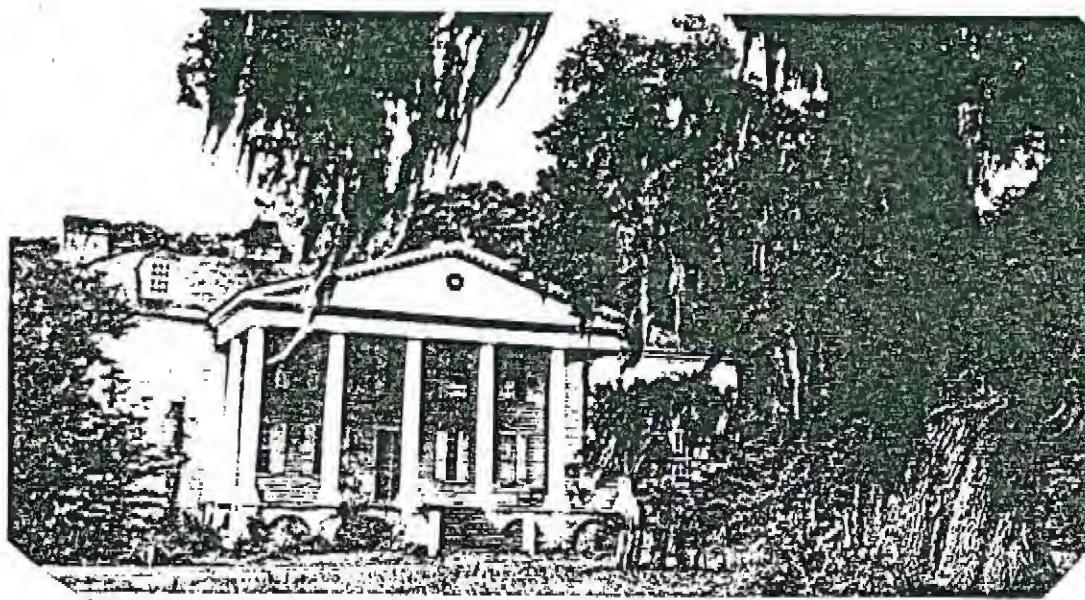
NOTES

YEARS INDICATED REPRESENT JULY 1 OF PREVIOUS YEAR TO JUNE 30 OF



HARIETTA GATE

Sandy Trails Through Pine and Hardwoods Lead
To the Old Plantation Homes.



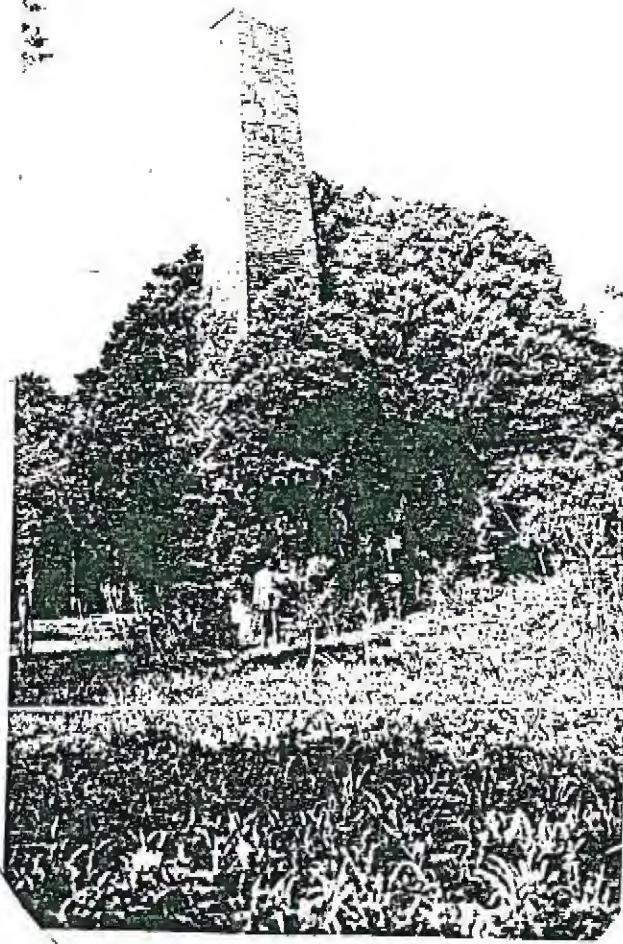
HAPTON

Surrounded By Live Oaks Dripping Spanish Moss,
Many of the Old Plantations Exist Today. This
is the Ancestral Home of Archibald Rutledge



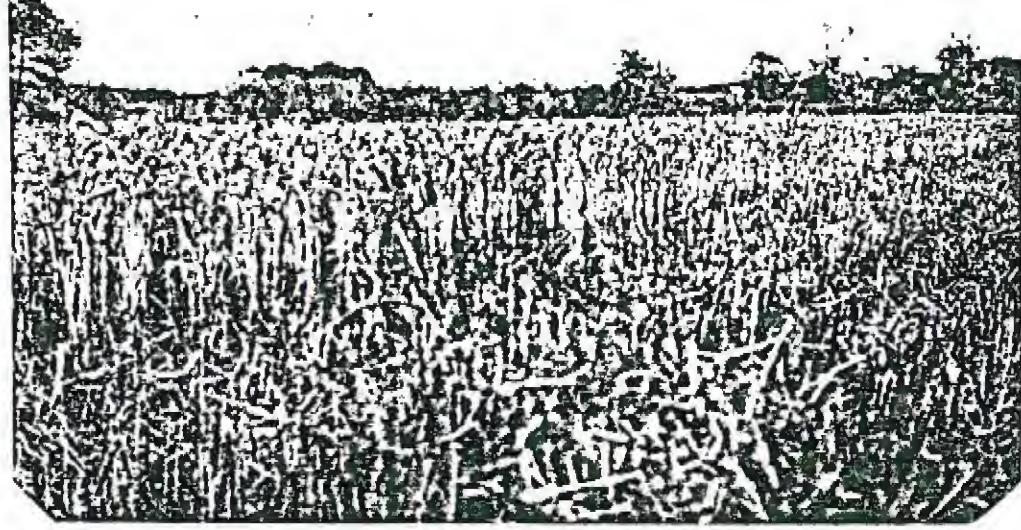
ABANDONED RICE FIELDS

Old chimneys in abandoned rice fields are relics of a past era. This is "Corn Marsh" (Spartina cynosuroides) on Cedar Island below the Intracoastal Waterway. It is in the lower extremity of the Brackish Water Zone formerly vegetated by fresh water species.



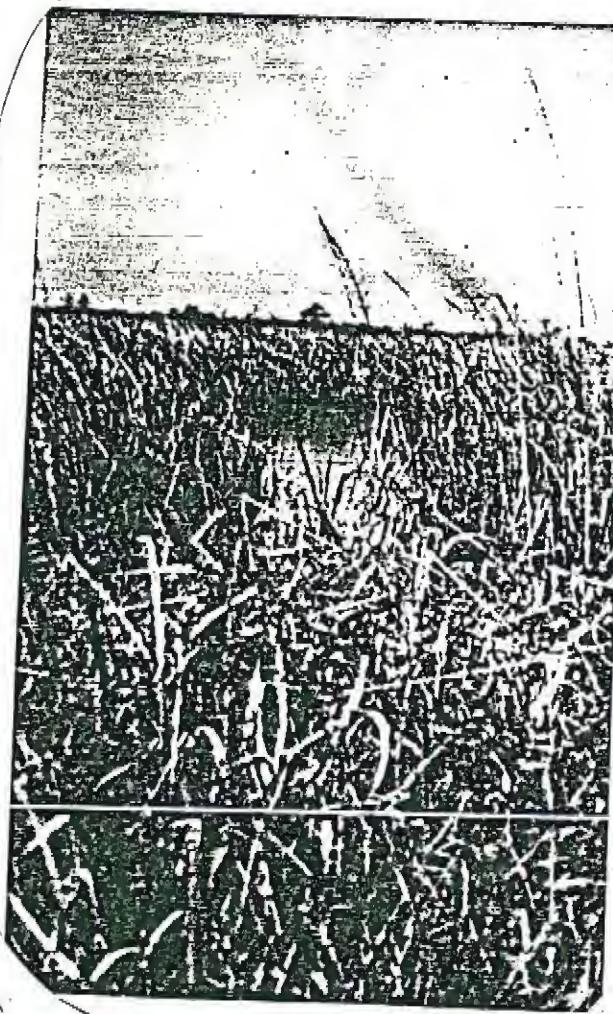
Old Rice Mill

The tall stacks of old rice mills still stand
on the edge of the marsh



RICE

In 1860 there were more than 16,000 acres of rice in cultivation in the Santee Delta. In 1939 there were less than 200. This field of rice was in cultivation on the Kinlock Plantation in the summer of 1941. Today there is none in the entire Delta.



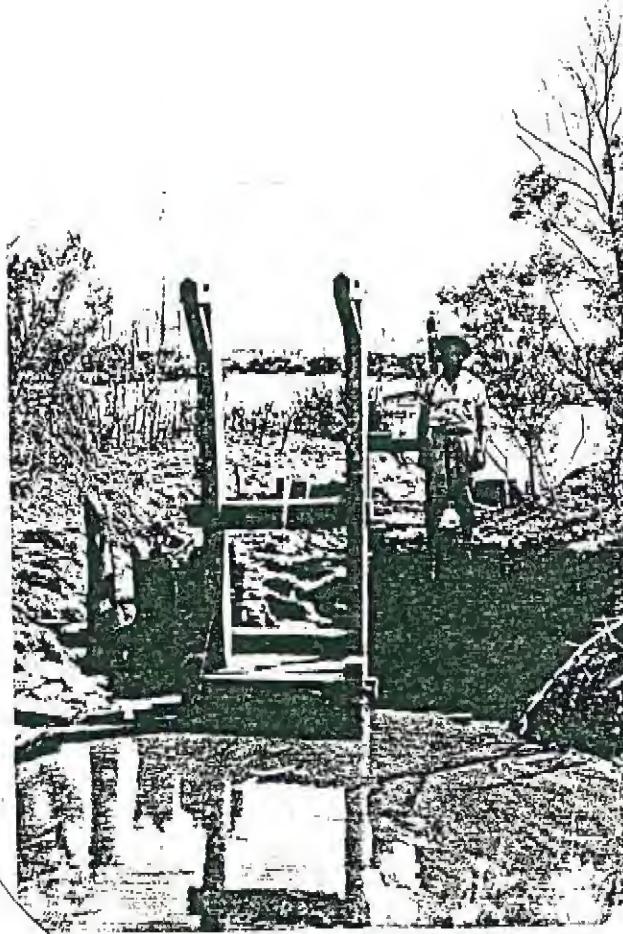
WILD RICE

With the abandonment of the fields the recently plowed land was densely vegetated with Wild Rice or "Duck Oats", the best natural duck food in the Santee Delta. Through management this plant was encouraged on all the plantations in the fresh water zone. This is a field of wild rice on the Pine Grove tract, a part of Kinlock Plantation.



PICKEREL WEED AND WAMPEE

Beds of Pickerel weed and Wampee in the fresh water marsh. These plants and associated species such as smart weed, four-square spike rush, marsh hemp, wild millet, and wild rice provided great amounts of food for waterfowl. This field is on Whiteoak Creek, Rice Hope Plantation. It has not been effected by the intrusion of salt water.



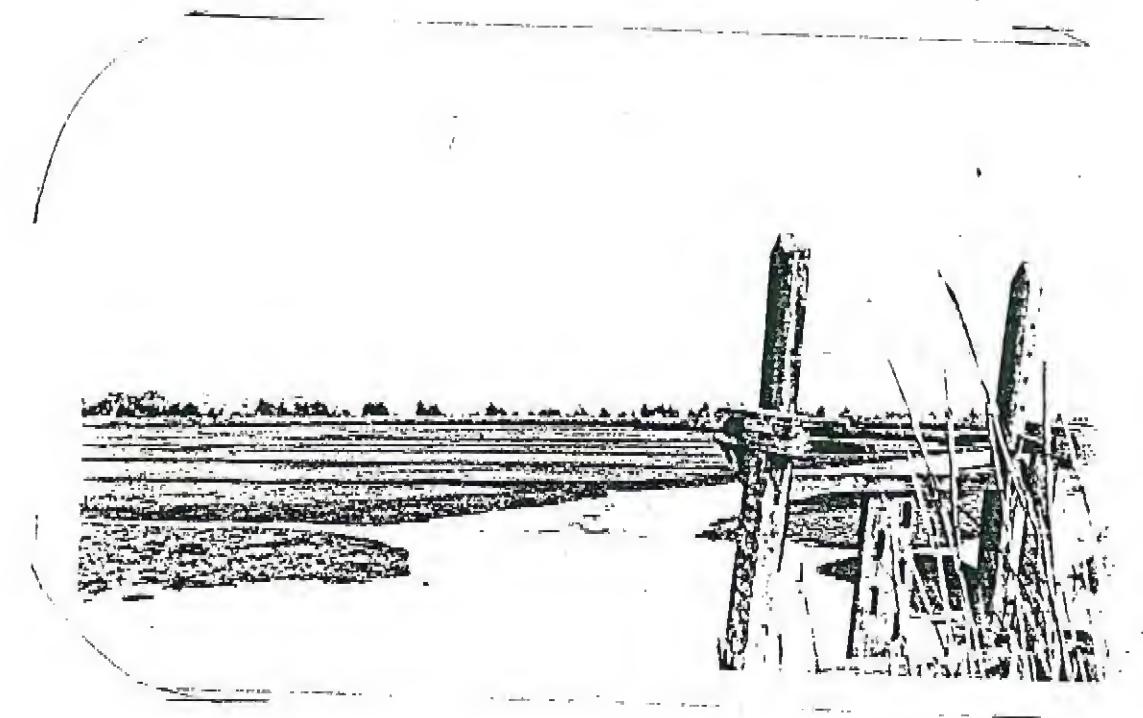
A Damaged Trunk

In managing the old rice fields for waterfowl the old banks and trunks were repaired and put back into operation. With the intrusion of salt water, however, they were not adequate in keeping salt water from the fields. Fresh water vegetation on the banks was killed, marine borers ruined the trunks, flood tides eroded the banks, and many of the trunks "blew out" completely. This trunk is on the old Indian Hill Plantation, a part of the Santee Club property on Pleasant Creek.



BLOW OUT

Here is a blow out. The trunk controlling the tidal waters has been washed away and the gaping hole in the old canal bank permits the tide to ebb and flow through the fields. Fresh water vegetation has been killed. The circular communities in the center of the field are volunteer stands of salt marsh (*Spartina alterniflora*), of no value as food for waterfowl. This field is on the Anandale Plantation near the old rice mill.



MUD FLATS

The old canal trunks no longer serviceable, salt water has ebbed and flowed into the field until every vestige of fresh water vegetation has been destroyed. Sufficient time has not elapsed for the establishment of salt resistant species of plants. This is known as the house field on Winyah Plantation. It is in the belt withstanding subjected to the greatest damage by salt water intrusion.



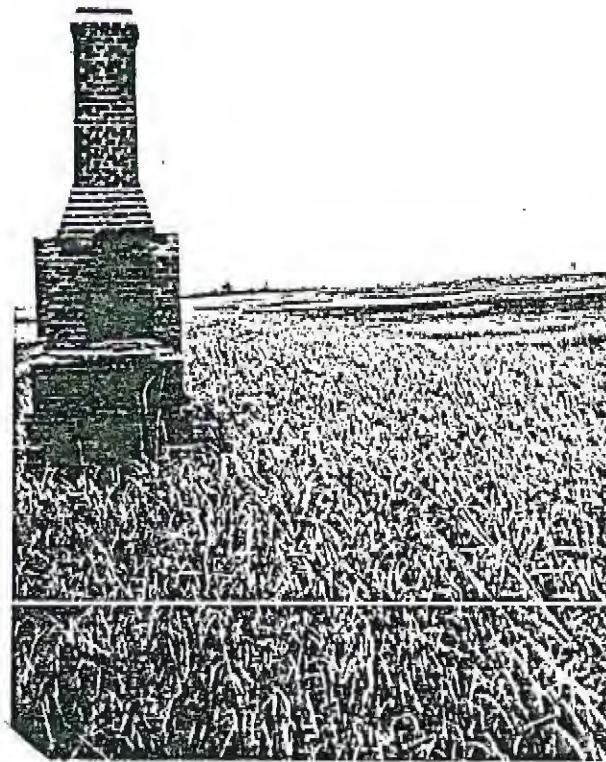
DEADENED TIMBER

Loblolly pine, cypress, red maple, gum, and hackberry are among the species of timber killed by salt water intrusion. This field and scattered timber stands are on Anandale Plantation near the old rice mill.



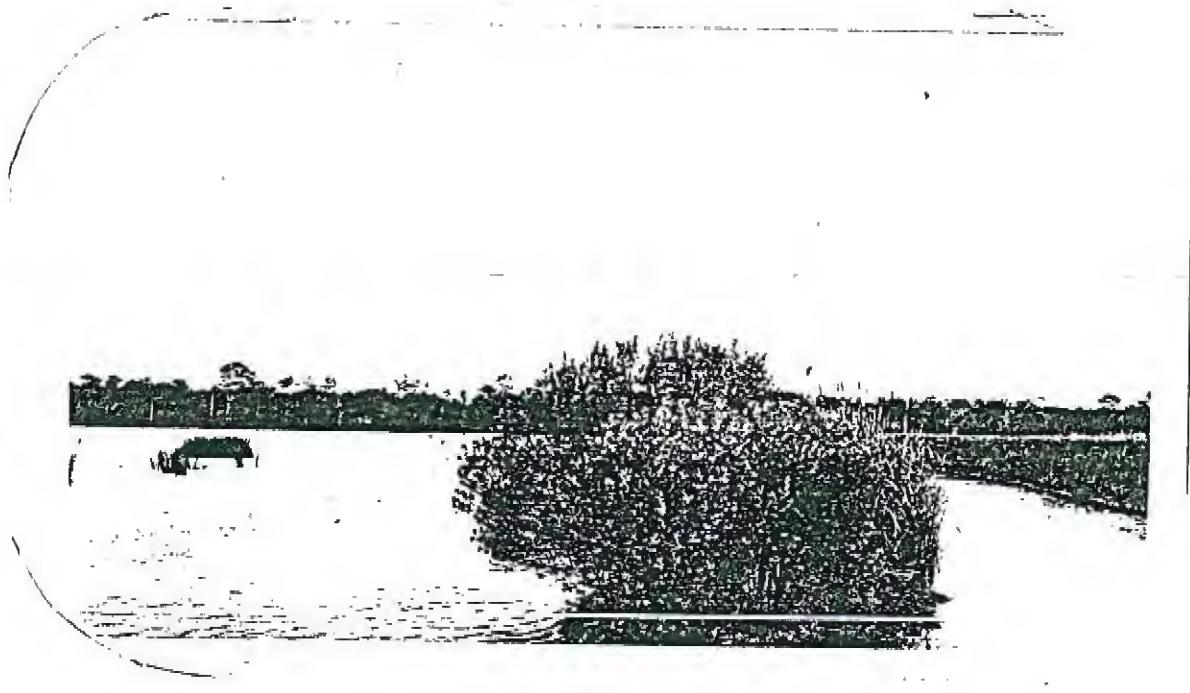
INVASION

The dead and fallen stalks of corn marsh on the left of Hoyt Mills witness the slow surrender of this plant and the invasion of salt marsh on the right of Hoyt Mills. This scene is on the banks of Minum creek about 500 yards upstream from its junction with the Intracoastal Canal.



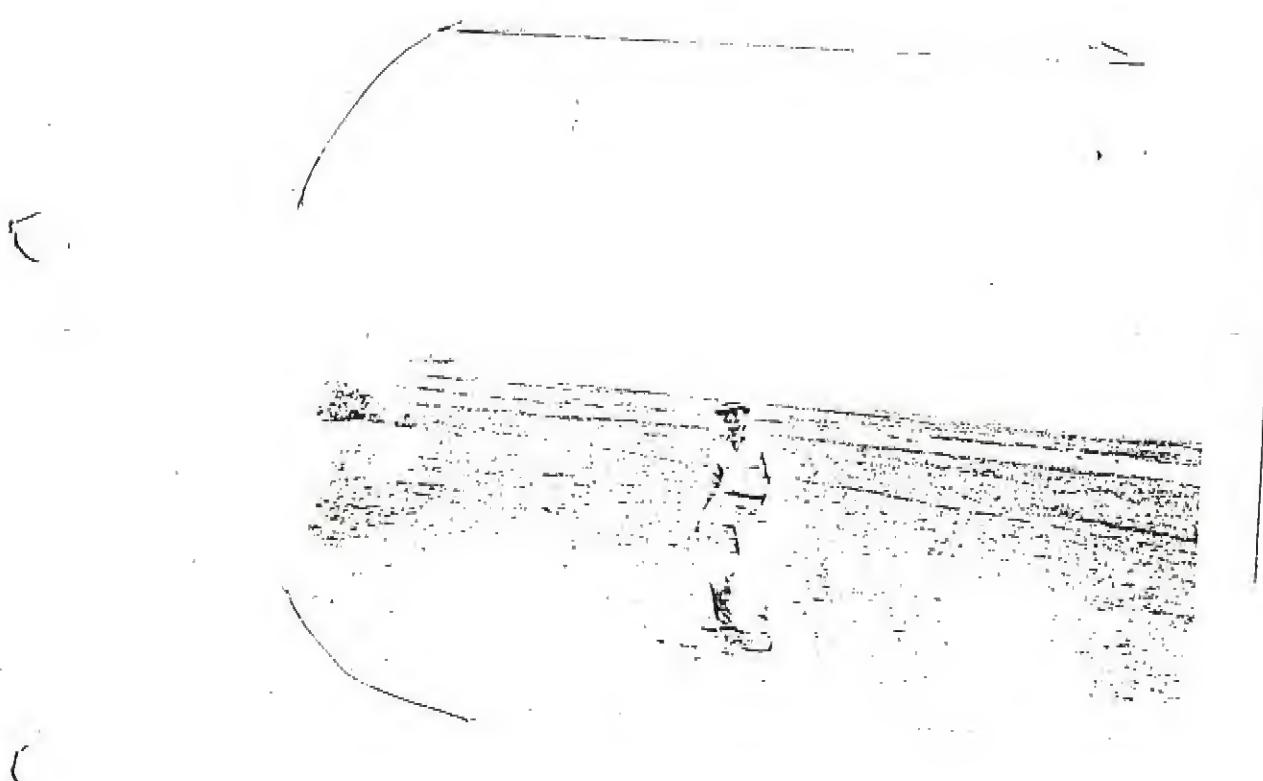
THE BRACKISH WATER ZONE

Climax vegetation in the brackish water zone usually consists of Cattail marsh as seen in this scene. The best growths of achieved on the well drained soils of the canal banks, but it will also dominate the vegetation of the lower flats. It is of no value as food for ducks and difficult to control. In the background are dark patches of Nut grass (Scirpus robustus). This is an excellent duck food, but is easily replaced by less desirable species. Through management, however, pure stands of this plant can be achieved. Plantation managers are striving to encourage this plant in the marshes and widgeon grass and banana water lily in the ponds.



RIVER ROW FIELDS

The River Row Fields, on the south side of the South Santee, have been seriously effected by salt water. The field on the left is devoid of vegetation, the vegetation of the left has been killed by salt water. The marsh on the right is soft stemmed bull rush having replaced fresh water marshes. Immediately in the foreground is an old dike supporting high tide and groundsel bushes and giant cord grass. The fields on the left are slightly lower than the one on the right which may partially explain why it was not revegetated. Both of these fields are open to the ebb and flow of the tides.



BARREN SOILS

Breckish marsh including such plants as Corn grass (Spartina cynosuroides) and Nut Grass (Scirpus robustus) ~~had~~ been completely eliminated from the flats along the on Murphy Island adjacent to the South Santee River. Glasswort is slowly invading the field followed by salt marsh and needle rush. A few clumps of Borrichia appear in the photograph.



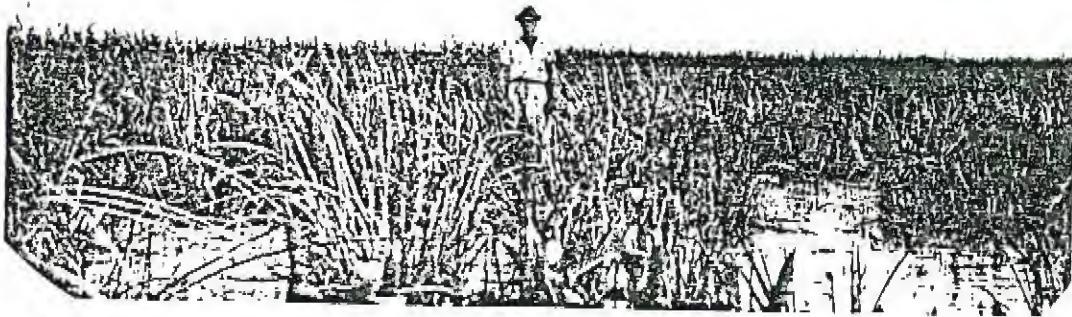
SALT WATER ZONE

Climax vegetation of the salt water zone assumes this disposition. The low flats support a dense growth of salt marsh (Spartina alterniflora). Lands with a slightly higher elevation which usually occur next to the upland support needle rush or black marsh (Juncus roemerianus.) Neither of these plants provide any food for ducks in this region. On still higher ground are the shrubs, High tide bush (Bacca Iva frustescens) and Groundsel bush (Iva frustescens). The sandy uplands and sea rims support a forest growth composed of such species as cedar, palmetto, live oak, magnolia, and loblolly pine.



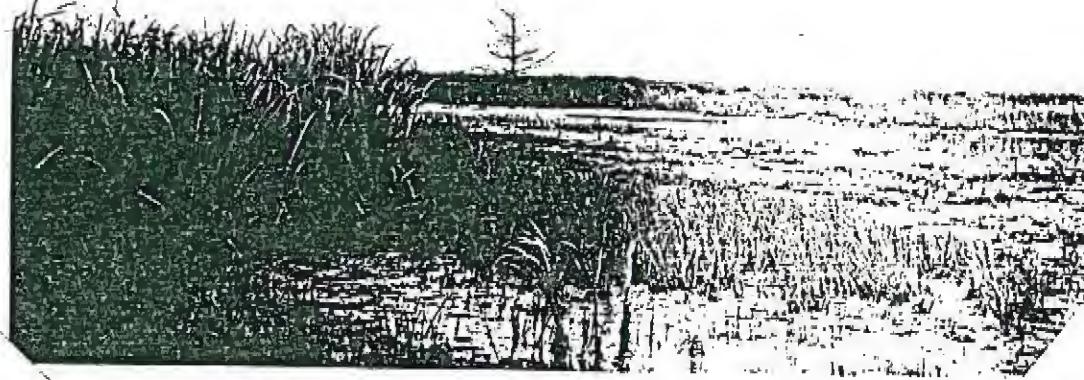
STRUGGLE FOR AN EXISTENCE

As fresh soil water has turned to brackish there is a struggle for existence between the pioneers and newcomers. Here three square (Scirpus americanus) ~~is giving way to~~ Corn grass (Spartina cynosuroides).



PARALYSIS

The invasion of salt water is not complete. It is like paralysis, slowly creeping up on the victim. The sweet soils are slow in the absorption of salt waters, and in rainy seasons may vary greatly in salt content. Slowly but surely, however, many of the fresh water marshes are continually loosing ground. In this scene whitemarsh (*Zizaniopsis miliacea*) and Dog tongue (*Sagittaria* sp.) are giving way to ~~Scirpus validus~~ Softstem Bullrush (*Scirpus validus*), a fresh to brackish water plant of considerable value as duck food. The growth of this plant seems to have been stimulated by the intrusion of salt water in the fresh marsh. It ~~occupies~~ occurs almost as a solid stand comprising more than 2000 acres. It occupies the upstream portion of the brackish water zone extending into the salt water zone.



SURRENDER

The soil water salinity in this field has become too much for the three square rush and a few corn grass is taking over. A few bedraggled cattails still survive. A lone sypress in the back ground has long been a corpse. The salinity of the water in this field tested 46.2 % sea strength.

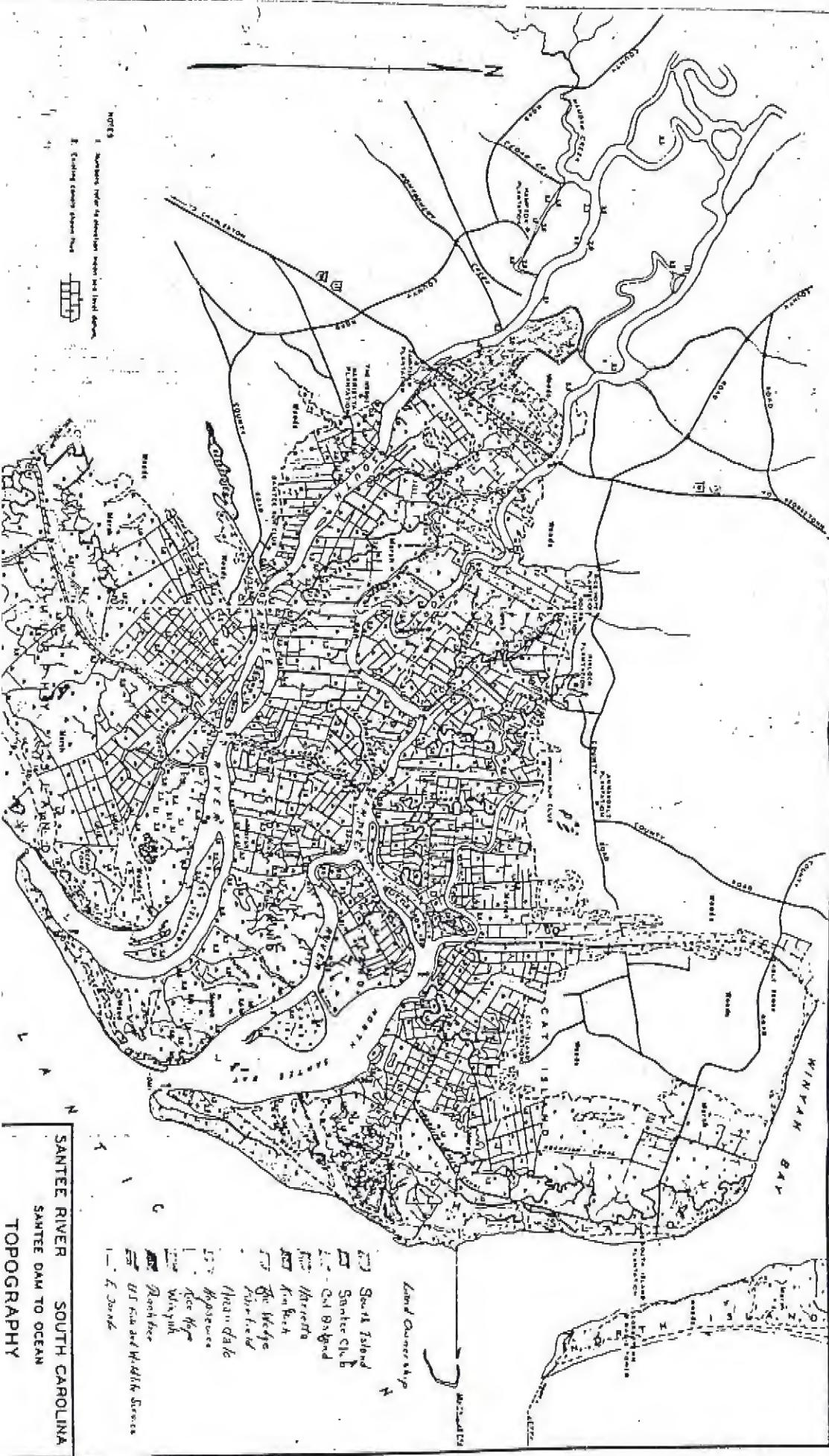


OUT OF PRODUCTION

These fresh marshes on the upper portions of the Delta have not been effected by salt water, but they have been "out of Production" for a long time. The old dikes are practically level with the ground, the marsh-s are dominated by species of marsh plants of little value as wildlife foods, and the marsh is being encroached upon by woody species.

אנו [ל]ען

סודם של מלחמות ומלחמות



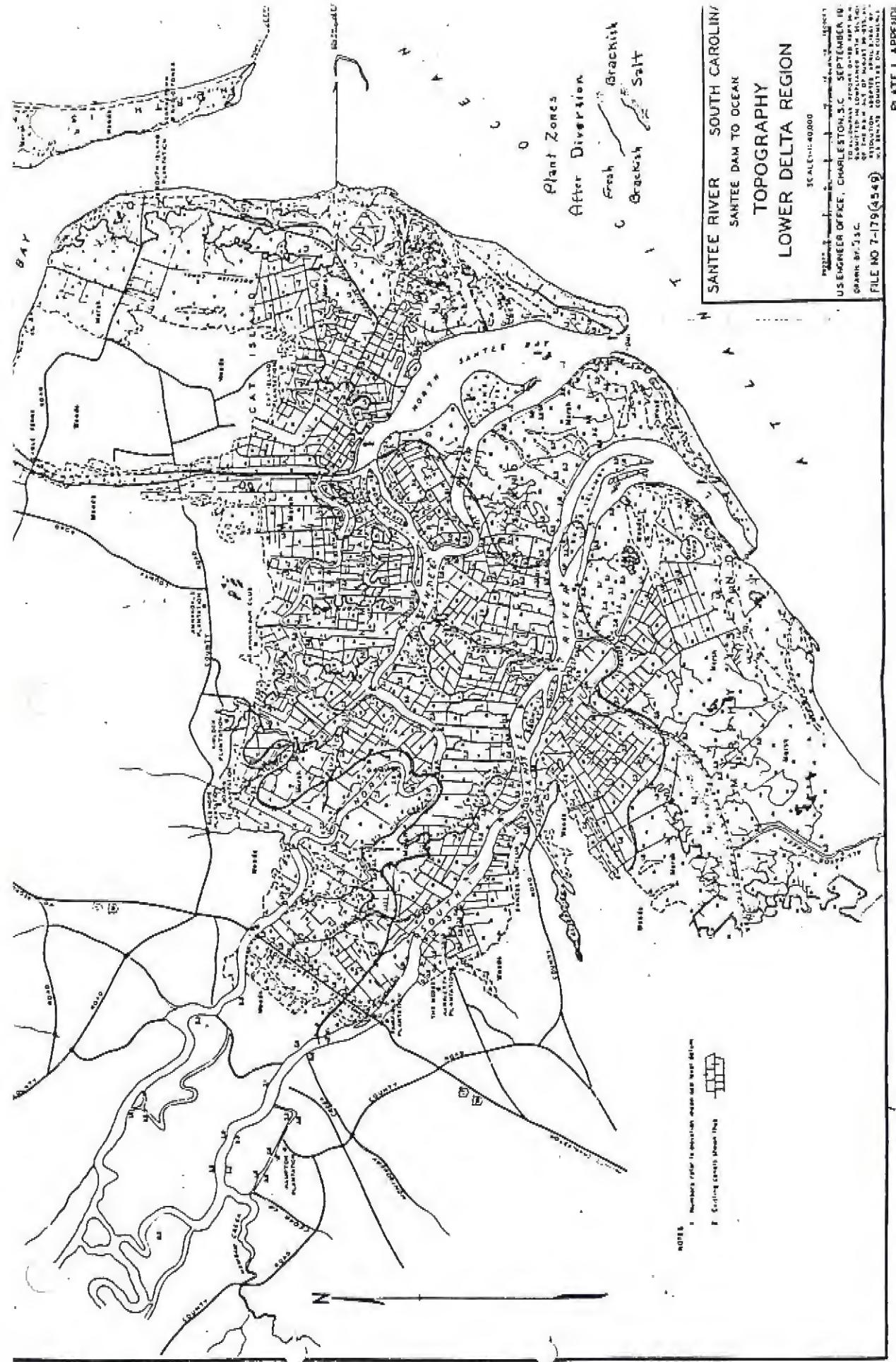
SANTEE RIVER SOUTH CAROLINA
SANTEE DAM TO OCEAN
TOPOGRAPHY

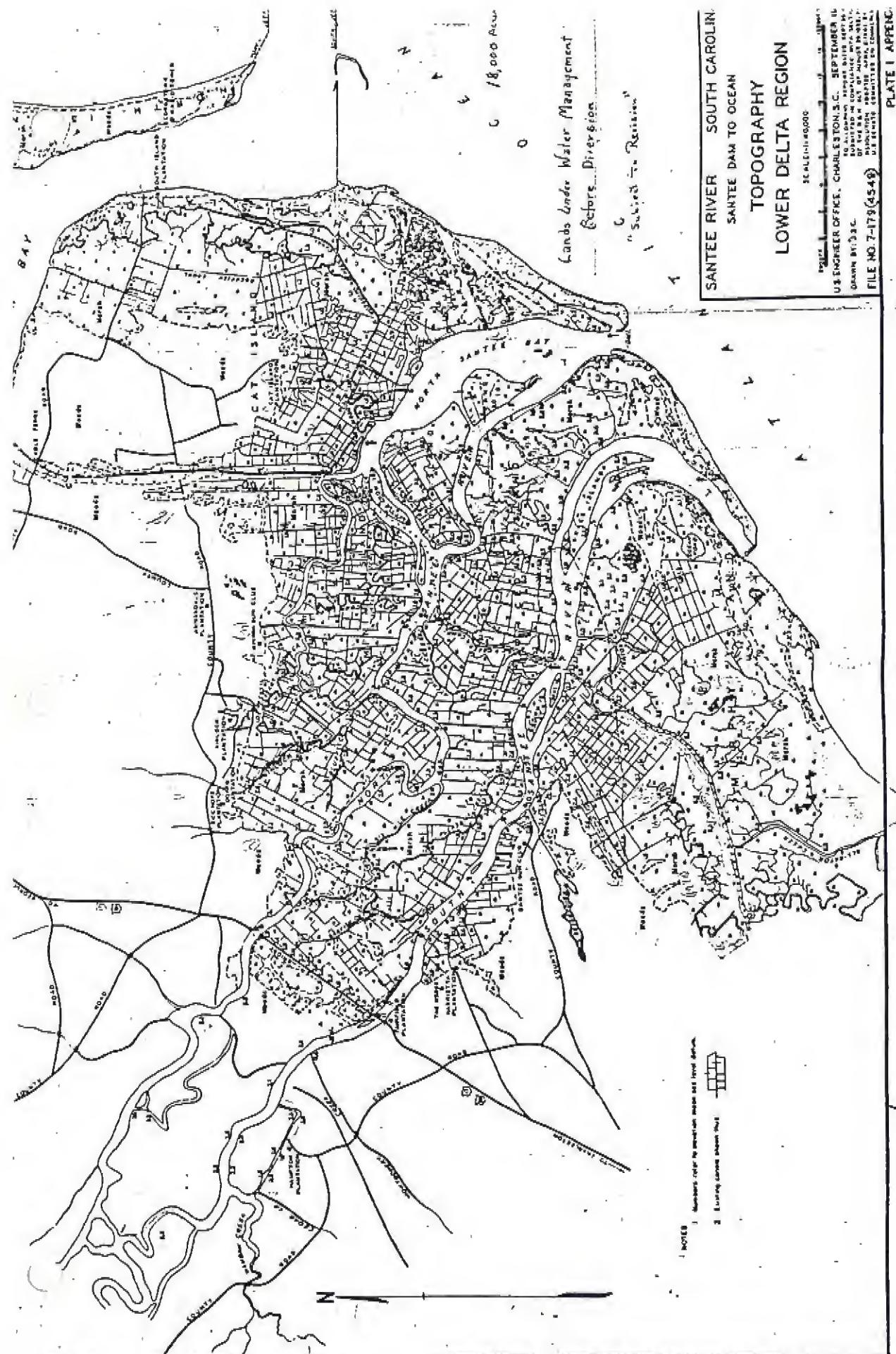
SANTEE RIVER SOUTH CAROLINA
SANTEE DAM TO OCEAN
TOPOGRAPHY
LOWER DELTA REGION

SCALING: 1:40,000
NOTE: Numbers refer to elevation map and water areas
F Corring Creek about 1/2

NOTES: 1. US ENGINEER OFFICE, CHARLESTON, S.C., SEPTEMBER 10, 1940.
2. To determine approximate area of water areas, multiply length by width in miles and divide by 640.
3. The following table gives the area of each water area in square miles and the number of acres.
4. The following table gives the area of each water area in square miles and the number of acres.
5. The following table gives the area of each water area in square miles and the number of acres.

PLATE I APPENDIX





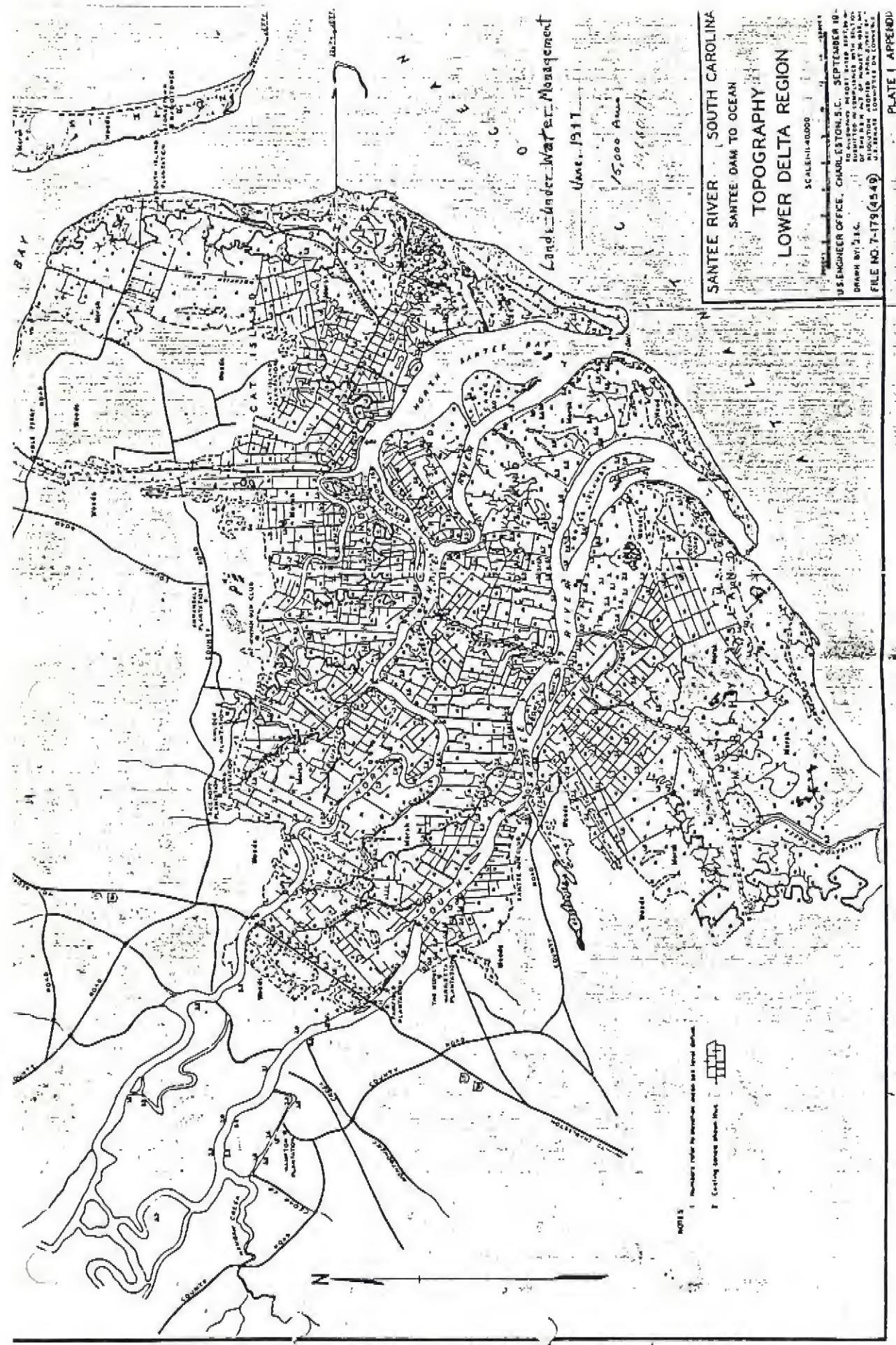
SANTEE RIVER SOUTH CAROLINA
SANTEE DAM TO OCEAN
TOPOGRAPHY
LOWER DELTA REGION

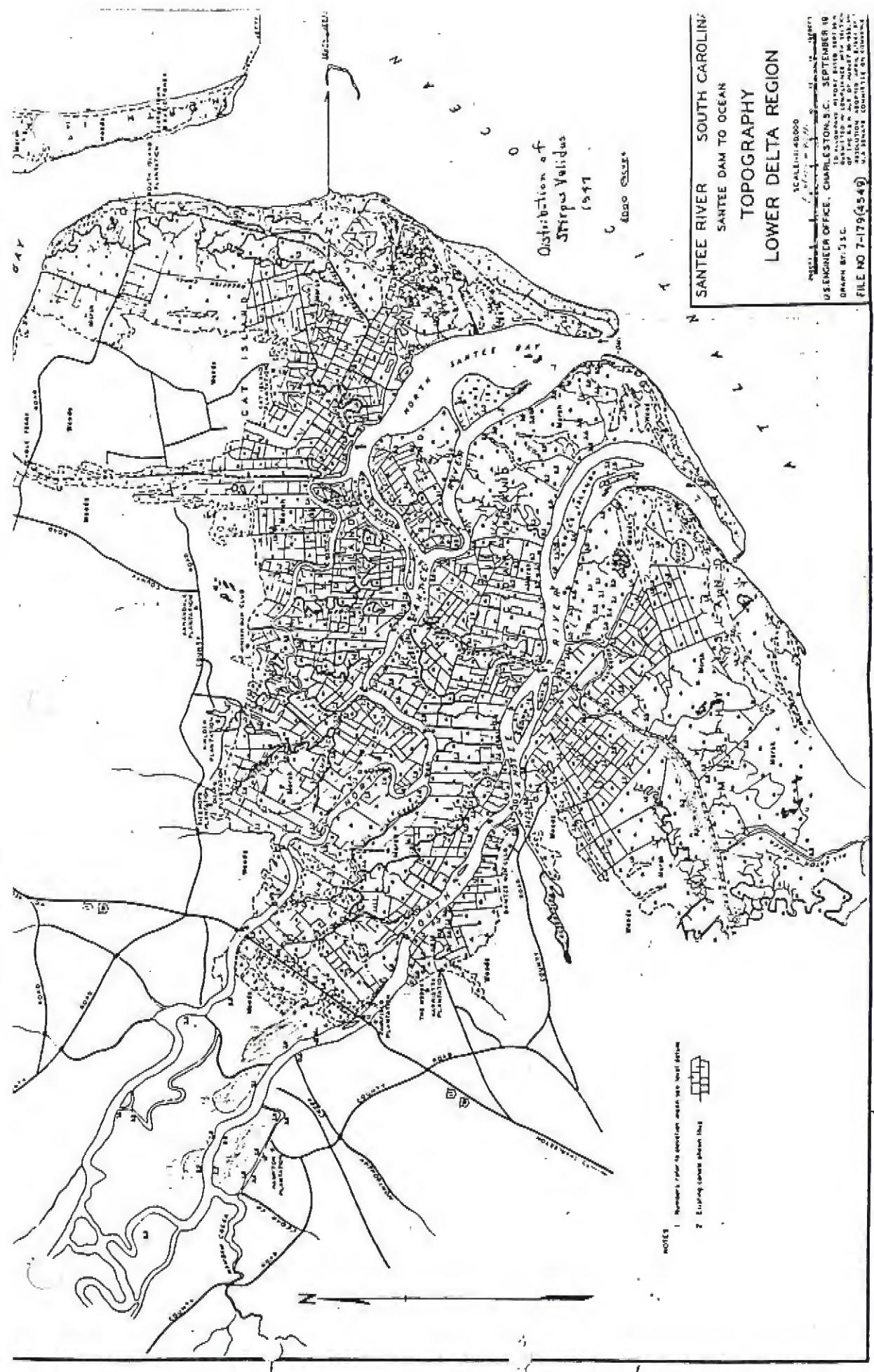
SCALE 1:40,000
U.S. ENGINEER OFFICE, CHARLESTON, S.C., SEPTEMBER 1942
DRAWN BY C.I.C.
FILE NO. 7-179 (454)

PLATE I APPENDIX

- NOTES
1. New bars, water to elevation marks see front sheet
2. Existing roads shown with
3. Roads
4. New OIKFS









Same letter and Enclosures to-
✓ Tom Yawkey - S. Island Plantation Georgetwon, S.C.
✓ Robt. S. Manigault, Winyah Plantation "
✓ Wm. N. Beach, Rice Hope Plantation "
✓ Hopsewee Plantation "
Archibald Rutledge Spartanburg, S.C.
Fairfield Plantation McClellanville, S.C.
Chas Woodward, Wedge Plantation "
Harrietta Plantation "
B. B. Reath II, Secy & Treas. XXXXZXXZXX
Santee Club, 11421 Chestnut St.
Phila. Penn. 526 Ten Forsyth Street Building

June 4, 1947

Mr. Wm. E. Phelps,
Cat Island Plantation
Georgetown, South Carolina

Dear Sir:

The U. S. Fish and Wildlife Service is continuing its studies with regard to the effect of salt water intrusion on the lower Santee Delta.

We need your cooperation in securing information regarding land use in the affected areas before and after diversion of the Santee River. Enclosed you will find two forms, one entitled: Land Use in Lower Santee Before and After Diversion, and the other, Waterfowl Kill. If the information is available, please execute these forms and return them to this office at your earliest convenience. We are attempting to complete our report by June 18, 1947. If all the information requested is not available, then we would appreciate any part that can be furnished.

If available, we would also appreciate receiving a map, showing your holdings. You may wish to indicate on this map pertinent data requested in this letter.

We thank you very much for your consideration in this matter.

Very truly yours,

C. Gordon Fredine
Regional Supervisor
RIVER BASIN STUDIES

WATERFOWL KILL

PLANTATION

1947	_____
1946	_____
1945	_____
1944	_____
1943	_____
1942	_____
1941	_____
1940	_____
1939	_____
1938	_____
1937	_____
1936	_____
1935	_____
1934	_____
1933	_____
1932	_____
1931	_____
1930	_____
1929	_____
1928	_____
1927	_____
1926	_____
1925	_____
1924	_____
1923	_____
1922	_____
1921	_____
1920	_____

LAND USE IN LOWER SAINTS DELTA BEFORE AND AFTER DIVERSION

PUBLICATIONS RECEIVED

Total Area (Acres)	Wetland Accreted	Ground Water	Before Restoration	Years After Restoration	At Present	Miles of New Walls Constructed	Miles Constructed
7,904	584	?	2,056	5,648	None	5,648	5 miles

<u>Lands Under Water Management</u>	<u>Before Information</u>	<u>3 yrs. After Dissemination</u>	<u>At Present</u>	<u>5,6,4,8</u>
5,6,4,8	None			

六

1000	900	618	130
500	400	648	100

G. Gordon Freidine
Regional Supervisor
RIVER BASIN STUDIES

Very truly yours,

We sincerely appreciate your prompt cooperation.
Information you have given us is very helpful and
essential photograph of South Island Plantation. The
thank you for your letter of June 9 and

Dear Sir:

Mrs. Thomas A. Wakley
420 Lexington Avenue
New York

June 11, 1947

525 Ten Forester Street Building

XXXXXX

Enc.

FAX: 12

You're very truly,

If there is any further information you desire, I will be only too glad to cooperate with you.

I have tried to indicate as well as possible the best that I have received to date concerning the control of water to offset conditions which have existed on the Lower Susquehanna since caused by the Cantee-Copper Dam. I might add that Mr. Roy Woods, who I believe was from your office, spent some time on my property, and I judge should have a very good picture of our general set-up.

I note that this represents last winter's waterflow seen, and when we get back to say 1941 (which was soon), judge that this represents last winter's waterflow in 1942. I have tried to the year starts off with 1947, therefore I far back as the season of 1929 and 1930. I note that far taken from a record which I have kept, but only as reasonably accurate. The number of the withdrawal led of my ability. These acreages are approximate, but are reasonably accurate to the best I have tried in the two forms to the best

Your letter of June 4th received, and I note that the Middle River is continuing its studies with regard to the effect of salt water intrusion on the Lower Susquehanna Delta.

Dear Sir:

Mr. C. Gordon Preddy
Regional Supervisor, River Basin Studies
U.S. Department of the Interior
Fifth and Middle Service
526 Ten Forest St., Building
Atlanta 5, Ga.

Date 9, 1947

THOMAS A. YAWKEY
420 LEXINGTON AVENUE
NEW YORK
SUITE 2750

LAND USE IN LOWER SANTEE DELTA
BEFORE AND AFTER DIVERSION

SOUTH ISLAND PLANTATION

Total Area <u>(Acres)</u>	Marsh	Swamp Woodland	Lands Under Water Management			Miles of New Dike Constructed
			Before <u>Diversion</u>	3 Yrs. After <u>Diversion</u>	At <u>Present</u>	
25,000	15,000	2,000	3,000	2,000	3,000	5,000
						Approximately 30 miles

Remarks:

WATERFORD MILL

South Island Plantation

1947	-	305
1946	-	985
1945	-	1021
1944	-	931
1945	-	1137
1942	-	919
1941	-	986
1940	-	661
1939	-	504
1938	-	397
1937	-	591
1936	-	302
1935	-	513
1934	-	998
1933	-	536
1932	-	647
1931	-	689
1930	-	476

June 9, 1947.

RICE HORSE PLANTATION
ROOM 1013, 551 FIFTH AVENUE
NEW YORK 17, N.Y.

Mr. C. Gordon Freethine
Hegeltonal Supervalve
Fiver Basenin Studies
526 Ten Forsyth Street
Atlanta 3, Georgia.

Dear Sir:

I have your letter of June 4th,
and will send it on to George Town in order to
secure the information you desire. As soon
as it has been received I will communicate with
you further.

RICE HORSE PLANTATION

Yours very truly,
By
Wm. N. Beach
President

June 9th.
ACKNOWLEDGING this letter of
Copy to: Mr. William N. Beach
Enc. 2.

GIB/j3

You're very truly,

to you in the study that you are making, we are, -
Hoping that these documents will be of some assistance

We note from your letter that you contemplate making
a report of the results of your investigation, that will
be ready sometime later this month. We wonder whether,
as a courtesy to Mr. Beach, you can furnish to him or to
us, a copy of the report.

This plate does not show all of it. Beach's Land Holdings,
but only portions thereof have been overflown by
salt water, together with the adjacent upland areas.
This date October 1946. A copy of the plate is also enclosed.
Mr. Beach has also had prepared a complete plat,
showing in a general way the areas affected by the
salt water. This plat is made by J. F. Gaillard, and
is dated October 1946. A copy of the plat is also enclosed.

It would be difficult to give the information
in the exact form in which you request it, but it so
happens that Mr. Beach is preparing to bring suit
against South Carolina Public Service Authority for
this damage, and in connection with that preparation,
he has prepared a statement of claim, that is dated
May 1, 1947. A copy of this statement is enclosed
for your information.

Letter to him of June 4th, asking for certain information
as to the damage to his property on the
Santee River, from the salting of the river.
Mr. William N. Beach has referred to us your

Dear Sir:

Mr. C. Gordon Threadgill,
Regional Supervisor,
River Basin Studies,
U. S. Department of the Interior,
526 Ten Forsyth St., Bldg.,
Atlanta, Ga.

June 13, 1947.

CHARLESTON, S.C.

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